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DOGS



JOURNAL OF CREATION

An international journal devoted to the presentation and discussion of technical aspects of the sciences such as geology, biology, astronomy, etc., and also geography, archaeology, biblical history, philosophy, etc., as they relate to the study of biblical creation and Noah's Flood.

COVER: Close up of a Grey wolf (*Canis lupus*)

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Editorial correspondence should be addressed to:

The Editor

Journal of Creation
Creation Ministries International
 PO Box 4545
 Eight Mile Plains
 QLD 4113
 AUSTRALIA

Email: journal@creation.com

Editorial Team

Dr Pierre Jerlström (head)
 Dr Don Batten
 Shaun Doyle
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Assistance and/or Sub-editing

Russell Grigg

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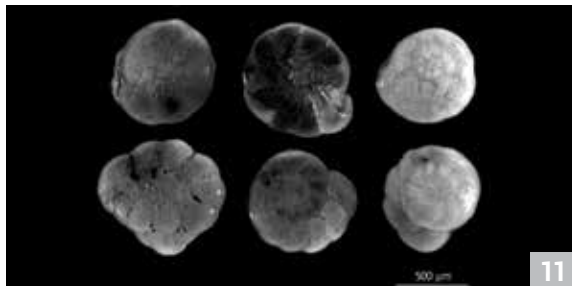
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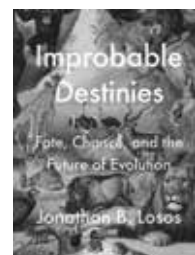
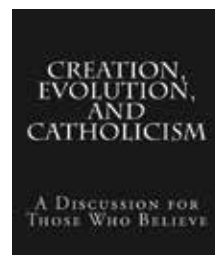
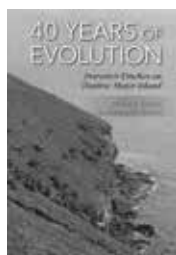
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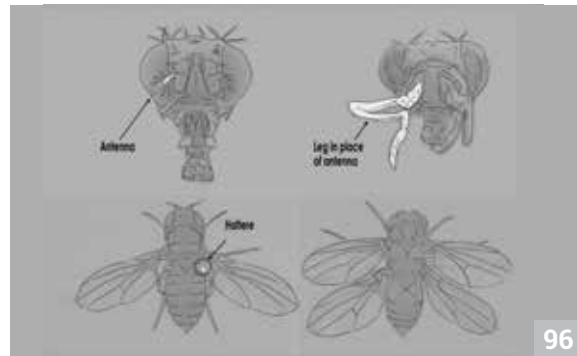
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Creation argument against the big bang no longer sustainable—CMB shadows and galaxy clusters

John G. Hartnett

I have previously made the argument that the *cosmic microwave background* (CMB) radiation, ‘light’ allegedly from the big bang fireball, casts no shadows in the foreground of galaxy clusters.¹ If the big bang were true, the light from the fireball should cast a shadow in the foreground of all galaxy clusters. This is because the source of the CMB radiation, in standard big bang cosmology, is what is known as the “*last scattering surface*”.²

The last scattering surface is the stage of the big bang fireball that describes the situation when big bang photons cooled to about 1,100 K. At that stage of the story those photons separated from the plasma that had previously kept them bound. Then expansion of the universe is alleged to have further cooled those photons to about 3 K, which brings them into the microwave band. Thus if these CMB photons cast no shadows in front of all galaxy clusters it spells bad news for the big bang hypothesis.

The Sunyaev–Zel’dovich Effect

The CMB radiation shadowing effect, or more precisely the cooling effect, by galaxy clusters is understood in terms of the Sunyaev–Zel’dovich

Effect (SZE). This is where microwave photons are isotropically scattered by electrons in the hot inter-cluster medium (ICM) (see figure 1) via an inverse Compton process leaving a net decrement (or cooling) in the foreground towards the observer in the solar system. Of those CMB photons coming from behind the galaxy cluster less emerge with the same trajectory due to the scattering. Even though the scattered photons pick up energy from the ICM the number of more energetic CMB photons is reduced. After modelling what this new CMB photon energy (hence temperature) should be, a decrement can, in principle, be detected.

Many studies found no shadowing

Starting around 2003 some published investigations, using this SZE, looked for the expected shadowing/

cooling effect in galaxy clusters. No significant cooling effect was found, by multiple studies, including the WMAP satellite data.⁴ This was considered to be very anomalous, significantly different from what was expected if the CMB radiation was from the big bang fireball. The anomaly was even confirmed by the early Planck satellite survey data in 2011.⁵

I published my original article⁶ in 2006 using this as evidence against the big bang. I based that article on the work of Lieu *et al.* (2006).⁷

Lieu *et al.* (2006) found that about 25% of galaxy clusters showed a cooler shadow, 25% showed a warmer shadow, and 50% showed neither heating nor cooling. But a cooling effect is what was expected with a mean decrement of as much as 160 μ K.

However, if another effect contaminated the data for those which showed no cooling effect then the test would be inconclusive. It could

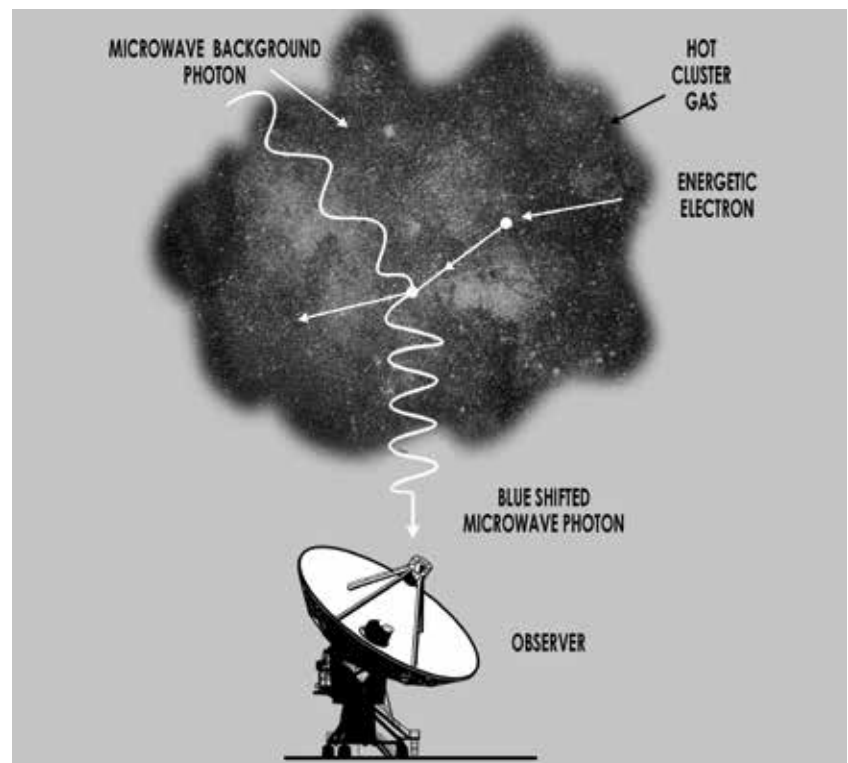


Figure 1. Schematic of the Sunyaev-Zel'dovich Effect that results in an increase in higher energy (or blue shifted) photons of the CMB when seen through the hot gas present in cluster of galaxies (after figure 8 in Weisskopf³)

mean that where a cooling effect was observed it was due to the SZE. Where it was not observed it could have resulted from contamination due to some other source.

One of the problems in the studies listed above is that they had to assume some model of the cluster in order to extract the expected decrement (see figure 1). The scattered CMB radiation is at much higher temperatures than the expected decrement. Locally it has been measured near 2.725 K,⁸ so a cooling effect of 160 μ K is relatively very small against that 2,725,000 μ K and the scattered CMB photons would be much hotter than this due to their picking up energy from the ICM.⁹

New study with new method

A new analysis method (published 2013)¹⁰ confirmed that there was a measured cooling effect attributed to the SZE in about 100 clusters selected using the SZE¹¹ or by their X-ray emissions. However in about 10,000 optically selected clusters the opposite result was found, where the mean temperature *rises* to about 10 μ K, an increment not a decrement. The scattered CMB photons are hotter than expected. There is a *heating not a cooling* effect observed in front of all those 10,000 clusters.

The previous studies necessarily used model-dependent methods. Whereas in this newest study⁹ the authors employed a statistical method that was free from such assumptions. They instead used the temperature of the CMB data pixels found near or away from the galaxy cluster under investigation.

“To study foreground effects of galaxy clusters, one can consider the viewpoint of CMB data pixels, simply taking each pixel as a probe. For one galaxy cluster in an ideal isotropy CMB, a simple method is used to compare the probe data (temperature data of this pixel) of angular regions affected and unaffected by the cluster. For

real CMB data, the fluctuation temperature of each pixel can be taken as another Gaussian distribution error of the detector. Considering the different properties of noise signals and the SZ signal, one can use statistical methods to compare the mean probe data of angular regions considered ‘to be’ or ‘not to be’ affected by the sample clusters. The noise signal will have similar effects on these two kinds of pixels, but *the thermal SZ signal will only depress the temperature of ‘to be’ affected pixels* [emphasis added].”⁹

The results of their study suggested this heating effect could be attributed to contamination due to radio emission of the cluster itself. This accounts for the anomaly in 99% of the clusters. That means that the small SZ cooling—a thermal effect—was possibly completely masked by contamination from the clusters. Considering that the original studies could not account for the increments in thermal emissions in front of the galaxy clusters, when decrements were expected, I think this analysis needs to be taken notice of.

Conclusion

Without anything to contradict their result, and the analysis seems strong, one must entertain the possibility that the anomaly first found by Lieu *et al.* in 2006 has been adequately explained. The problem of course is that astrophysics is not exactly operational science.¹² At best my original no-shadow argument (2006) is now equivocal and hence I suggest that it should no longer be used as a creationist argument against the big bang hypothesis.

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- The *last scattering surface* allegedly produced the first photons that were free to travel throughout the volume of the universe. Thus they should be the oldest photons and should be travelling throughout the volume constantly, creating an isotropic background, which today is called the cosmic microwave background (CMB). In any direction we look in the universe, we should see galaxy clusters ‘back lit’ by those CMB photons travelling toward us, thus creating a ‘shadow’.
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- The CMB temperature at the cluster is higher by a factor $(1+z)$, where z is the cluster redshift.
- Modelling of the cluster needs to accurately reproduce the intercluster cluster medium (ICM) electron density. CMB photons, with a temperature of $2.725(1+z)$ K on entering the cluster, pick up energy from the energetic electrons in the ICM but due to their isotropic scattering they are slightly cooled in the line-of-sight direction towards the observer than would be expected if they were not scattered by the SZE. Thus, these photons are slightly less ‘warm’ than expected. This is the shadowing effect.
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- Clusters found from the CMB by the cooler shadows attributed to the SZE.
- It largely boils down to what I call ‘stamp-collecting’ (accumulating an ensemble of similar objects) and statistical arguments based on whether or not one has a representative sample. But because of the inherent restricted access to what you cannot see in the cosmos even that is subject to modelling.

Tunnel valleys can be formed in one ice age by catastrophic flow

Michael J. Oard

Tunnel valleys or channels are large, elongated, over-deepened valleys cut into sediments or bedrock by subglacial meltwater during the Ice Age.¹ They frequently form sinuous, anastomosing networks oblique to the topographic gradient.² Tunnel valleys can reach more than 100 km long, 4 km wide, and up to 400 m deep. The bottom of a tunnel valley is sometimes flat, but the long dimension more commonly undulates, sometimes trending upslope and can have over-deepened areas with bedrock thresholds up to about 100 m. Some start and end abruptly.

Tunnel valleys are found over numerous glaciated areas, such as the outer continental shelf off Nova Scotia;³ southern Ontario, Canada;⁴ northern Alberta, Canada;⁵ east-central Minnesota⁶ and Wisconsin,⁷ USA; north-west Europe⁸; and the central Barents Sea.⁹ Figure 1 shows

the ubiquitous tunnel valleys in north-west Europe.

Tunnel valleys have also been discovered offshore. Some of the largest and best documented occur in the North Sea, and are thought to have formed over multiple glaciations,¹⁰ and then infilled by sediment from European rivers.

After a tunnel valley is first cut, it is usually (but not always) filled in. The Finger Lakes of New York are examples of tunnel valleys that were partially filled in with sediments.¹ The sediment fill is varied, and includes glacial till, glaciofluvial sands and gravels, sediment gravity flow deposits, and glaciolacustrine silts and clays. In tunnel valley fill, glacial till is uncommon and is found mainly along the edges of the valley or on top of other infill deposits (figure 2), indicating a meltwater origin with little subsequent modification by ice.¹¹

Eskers, often on top of the tunnel valley fill and parallel to the valley, and drumlins in the vicinity of tunnel valleys sometimes also occur. The eskers sometimes end in an outwash fan at an ice-marginal position. The tunnel valleys sometimes cut through drumlins and moraines, indicating that they formed during deglaciation.

Over 20,000 km of buried valleys are found on the Canadian Prairie.¹²

Most are pre-glacial valleys carved in poorly consolidated bedrock. In Alberta, these valleys occur between plateaus capped by consolidated-to-unconsolidated, rounded quartzite gravel, up to boulder size,¹³ having come from areas of bedded quartzite in central Idaho and the Canadian Rockies. The preservation of these plateaus indicates that glacial erosion there was slight, which reinforces the idea of a single ice age in that region.¹⁴ This geomorphology of Alberta indicates Flood sheet flow erosion transforming into channelized flow that cut the valleys and spread quartzite gravel over most of the area. The surface of the prairie was later eroded with the quartzite gravel mostly reworked during the Ice Age, forming tunnel valleys.

Origin of tunnel valleys poorly understood

Russell and colleagues write: “Despite the ubiquity of tunnel channels and valleys within formerly glaciated areas, their origin remains enigmatic.”¹⁵ There is much controversy surrounding the origin and evolution of tunnel valleys.¹⁶ It is accepted that tunnel valleys “were eroded by large, channelized subglacial meltwater flows that were driven by the hydrostatic gradient of the overlying ice sheet”.¹⁷ The hydrostatic gradient is related to both ice thickness and surface slope. The main controversy is whether the tunnel valleys formed at once or were shaped slowly by steadily but repeated meltwater discharges. The flows of water could be large catastrophic subglacial floods.

In areas with numerous tunnel valleys, such as the North Sea, researchers have claimed that they were eroded during seven glacial cycles between 500 and 40 ka.¹⁸ Piotrowski claimed that the abundant tunnel valleys in north-west Germany date from the last three glaciations.¹⁹

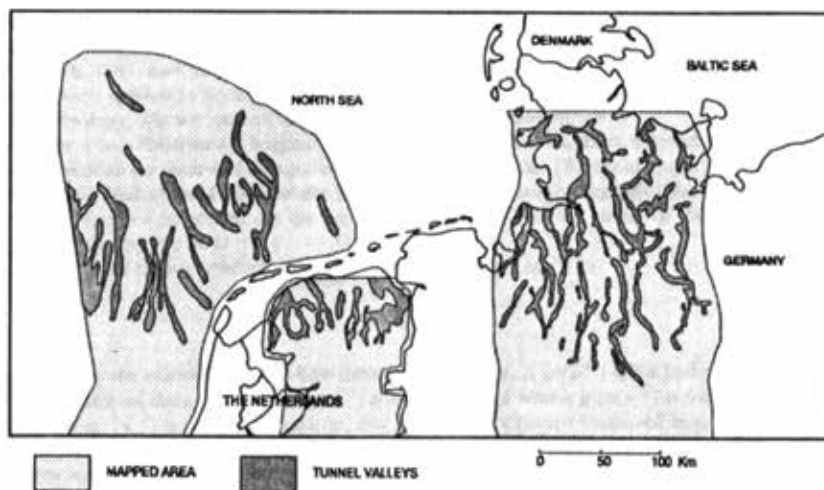


Figure 1. Tunnel valleys in north-western Europe (from Van Duke and Veldkamp⁸)

New research shows tunnel valleys can form in one ice age

New research in north-eastern Alberta, Canada, indicates that one ice age could have produced numerous tunnel valleys¹⁷ based on laterally extensive sheet-like sand and gravel bodies that extend beyond the margins of the tunnel valleys. These sediments indicate water flowed as a sheet under the ice before diminishing into shrinking channels. Glacial till interbeds (unusual for tunnel valleys) could have been formed by multiple subglacial floods of moderate intensity during one ice age:

“However, in our reconstruction, we propose that rather than spanning multiple glaciations, tunnel valleys in northeast Alberta evolved due to a combination of steady-state subglacial drainage processes, punctuated by time-transgressive episodic jökulhlaups [glacial

outburst floods, an Icelandic term] during a single cycle of Laurentide glaciation No evidence has been found in this study that supports near-synchronous erosion of tunnel valleys by catastrophic bankfull discharges. Rather, the valley fills described in this paper document jökulhlaups which were of low to moderate magnitude and/or high velocity, which at times reused existing valleys, while at others, eroded new valleys.”²⁰

Since these tunnel valleys are similar to those found elsewhere, I propose that all tunnel valleys formed during one ice age, during catastrophic glacial melting. This hypothesis contradicts those suggesting tunnel valleys formed during multiple glaciation events, particularly in the North Sea and northern Europe.

Regarding the tunnel valleys claimed to be from three ice ages in

north-west Germany,¹⁹ Ó Cofaigh says there is no basis for this designation:

“His interpretation of both the genesis and age of these diamict units [within the tunnel valleys] is open to question, however, because 1) there are no detailed facies descriptions of the units he interprets as tills and he presents no firm sedimentological evidence to support this interpretation; and 2) the tills themselves are dated only indirectly according to their stratigraphy position and petrography.”²¹

Tunnel valleys in the North Sea commonly cross-cut one another, which is probably why they are claimed to be from seven ice ages.^{10,18,22} The researchers seem to be relying on the cross-cutting relationships between some of the tunnel valleys in the North Sea to place them in different ice ages, to fit the Milankovitch theory of the ice ages. In reality, these tunnel valleys cannot be dated: “The paucity of stratigraphic age data for the Pleistocene succession in the North Sea makes the absolute dating of the tunnel valleys problematic.”²³ Multiple generations of tunnel valleys can be caused by multiple subglacial flood bursts. Some of these bursts could easily cross-cut previously formed tunnel valleys—all within a single glaciation. This level of activity should not be too difficult to conceive, since the central North Sea has unconsolidated Pleistocene sediments up to 1,000 m thick.²² Wingfield even suggests that the tunnel valleys could be carved almost instantaneously if a 500-m-deep glacial lake suddenly burst, which would result in currents moving at 50 m/sec.²⁴

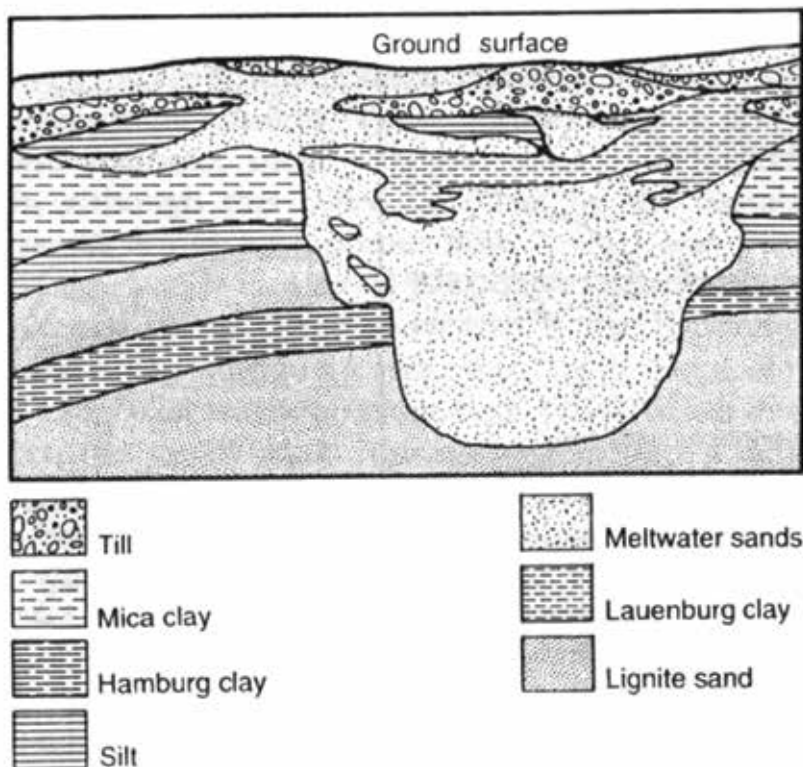


Figure 2. Typical tunnel valley fill (from Ó Cofaigh¹). Note that glacial till, the deposits from the ice itself, are rare within the tunnel valley, indicating subglacial meltwater eroded them.

Can tunnel valleys form catastrophically?

There has been controversy over whether tunnel valleys were carved gradually by sporadic modest subglacial floods or cut quickly by large catastrophic floods, as envisioned by Wingfield and John Shaw and

colleagues.⁴ The evidence for moderate to large catastrophic subglacial floods is substantial. The valley fill often includes boulders that would require strong flow to move.¹⁹ Rocks up to 2 m have been observed in Wisconsin in an outwash fan at the base of a tunnel valley, suggesting a strong outburst flood from stored subglacial meltwater.⁷ Percussion marks on some of the boulders support fast currents under high pressure.¹ In addition, the water sometimes flowed uphill; there are integrated, anastomosing channels; and channels show undulating bottoms with over-deepened basins. The size and number of steep channel walls also suggest catastrophic formation.^{1,25} Curvilinear features observed in tunnel valleys in central Poland suggest high-energy flow vortices.²⁶

Many researchers accept the catastrophic origin of tunnel valleys by high quantities of high-pressure subglacial flows,^{27,28} but this causes difficulties in explaining the timing of the events in relation to the stratigraphic record.¹ High-pressure sheet flows can result from the depth of the ice sheet or from rapid glacial movement, such as surges. Kavanaugh and Clarke report that subglacial water-pressure records from a glacier in the Yukon Territory, Canada, indicated there was once much higher pressure than can be explained by the depth of the ice.²⁹ Laboratory experiments indicate that pressures up to 15 times the ice-overburden pressure can be generated by abrupt ice motion.

Formation of a tunnel channel was observed during the 1996 jökulhlaup from under a glacier in Iceland. The flood waters originated from a subglacial lake and had to ascend 300 m, indicating high-pressure flow. The bottom of one 160 m section of the tunnel channel rose 11.5 m. The flood first issued from the entire 23 km edge of the glacier as a sheet flow, before shrinking to several large channels. Peak discharge was about 50,000 m³/sec through unconsolidated sediments, but estimated to be around

640 m³/sec for tunnel channel formation.¹⁵

Shaw and colleagues have proposed very large subglacial floods, and tunnel valleys indicate that they are on the right track. It is still unknown just how catastrophic these floods were.

Summary

Tunnel valleys are common features associated with glaciated areas, but their origin is enigmatic. Since some channels exist in cross-cutting relationships, tunnel valleys are thought to have been cut in multiple ice ages. But if they formed rapidly by catastrophic flooding, it is not unreasonable to conclude that they formed during one ice age.

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ERVs and LINEs—along novel lines of thinking

Peer Terborg

A major part of the genomes of organisms is made up of what scientists now call transposable and transposed elements (TEs). The most complex TEs are endogenous retroviruses (ERVs) and long interspersed nuclear elements (LINEs). Approximately 8% of the human genome is made of ERVs and 17% of LINEs. A growing number of investigations define these elements as important structural and regulatory elements of the genome and they are increasingly appreciated as a major driving force of evolution.¹ The mainstream opinion still interprets these genetic elements as the remnants of ancient invasions of RNA viruses, although, like protein coding genes, more and more functions are attributed to them. Previously, I referred to these elements as variation-inducing genetic elements (VIGEs),^{2,3,4} since they appear to be particularly

good at generating novel genetic contexts and regulatory environments. In this short perspective, some unexpected novel functions of ERVs and LINEs will be highlighted.

LINEs

The first class of TEs (or VIGEs), which has recently gained a lot of attention, is LINEs. Although current philosophers of nature believe that LINEs—like ERVs—have their origin in RNA viruses, which invaded the genomes in ancient times, this view is untenable, knowing that presently there are no RNA viruses resembling LINEs. LINEs have a unique genetic make-up, and the only reason to perceive them as RNA virus remnants is that they have a reverse transcriptase enzyme resembling that of ERVs. Still, the actual origin of LINEs is completely unknown. LINE1, the only transposable element active in the human genome, is a complex genetic element with two open reading frames: ORF1 and ORF2. The protein coded by ORF2 provides essential enzymatic activities for the reverse transcription, as well as for integration of a newly transposed copy of LINE1. LINE1 propagates through a copy-paste

mechanism, thereby leaving identical copies on different positions in the genome. The exact role of ORF1 is unclear. It specifies a protein with protein-binding properties, but it can also function as a nucleic acid chaperone.⁵ Why do organisms contain such extremely elaborate mechanisms to induce variation in their genomes?

From immunology, we know that T and B cells also have mechanisms to produce variation in their DNA sequences to rapidly increase the specificity of their intruder-recognition systems (T-cell receptor and immunoglobulin rearrangements). The VIGE hypothesis holds that LINEs are a tool to induce or deliver variation. But where? Could they be involved in learning processes in the brain? Here, billions of differentiated neurons require continuous plasticity to operate in neuronal networks.⁶

One of the most unexpected novel functions of LINE1 is constructing a layer of fine-tuning in the neural networks in the brain. The mammalian brain is an extremely complex organ made up of a thousand different types of neurons that perform a variety of functions. In 2015, an Australian team of researchers revealed that the DNA of hippocampal and cortical neurons is

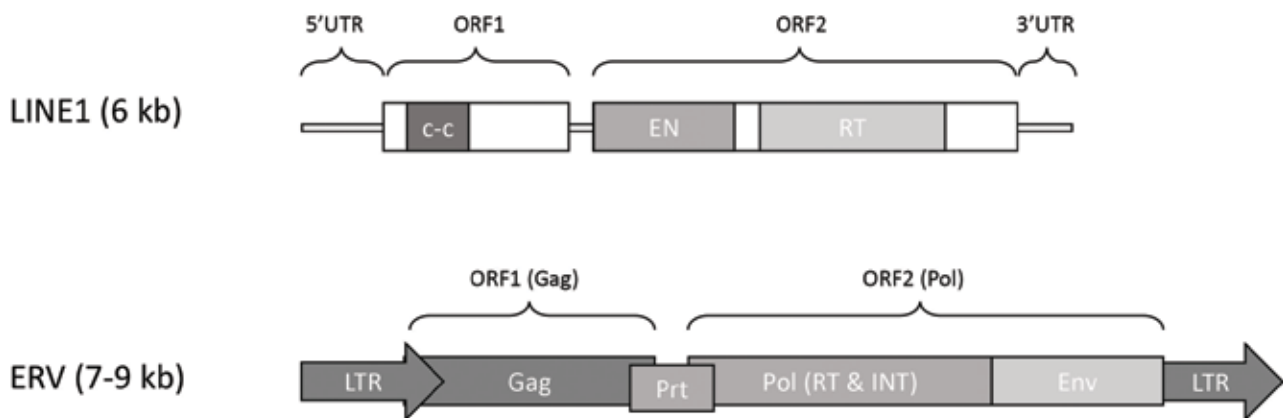


Figure 1. Genetic organization of the two 'evolutionarily' unrelated transposable elements, LINE1 and ERV. LINE1 is about 6 kilobases (kb) long, while ERVs vary between 7 and 9 kb.

UTR = untranslated region; ORF = open reading frame; c-c = RNA & protein-binding protein; EN = endonuclease; RT = reverse transcriptase; LTR = long terminal repeat; Prt = protease; Pol = polymerase, which codes for a reverse transcriptase (RT); and an integrase (INT). Some ERVs also contain an Env gene, which codes for an envelope protein.

distinct, due to LINE1 mobilizations and retrotranspositions, which contribute to cell mosaicism. Most neurons in the brain have alterations to their DNA that make each neuron genetically unique. The researchers suggested that LINEs were potentially involved in building and fine-tuning neuronal networks.⁷ Similarly, a group of neuroscientists of the Salk Institute in California, US, showed that LINE1 in healthy neurons does not just insert DNA but also removes it.⁸ The researchers described how LINE1 deletes whole genes and consequently causes disparity between neurons, since such variations may affect the expression of genes critical to the developing brain.

The findings may explain what makes our thoughts and sensations so unique, and why identical twins can be so different. Because the brain is composed of billions of differentiated neurons—not one is identical—the genome requires a mechanism to induce such variation, just like the immune system requires variation-inducing mechanisms to generate millions of distinct antibodies and T-cell receptors. The enormous amount of variation required cannot be coded into the genome, as it would exceed the dimensions of the cell. If the information needed to produce the different neurons had to be recorded in the genome, it would be too large to function as a data processing system. Here, LINE1 functions to generate variation in the neurons and they clearly provide a genomic mechanism to increase processing power. That this variation-inducing mechanism does not act randomly is evident from the fact that no cancers of hippocampal cells are known to medical science.

Another recently identified function of LINEs is the formation of eukaryotic ‘operons’. In microbiology, an operon is understood as the functional unit of the DNA of prokaryotes (bacteria), which consists of several collinear

genes that are expressed together and code for proteins with related functions (such as an integrated metabolic pathway). In the genomes of higher organisms, the eukaryotes, collinear operons are uncommon. Nevertheless, many proteins must be expressed together in cooperating networks. A 2016 study suggested that interactions between distant DNA regions make it possible for different genes to be expressed together.⁹ Hence, LINEs may function to bring together co-expressed genes operating in functional biological networks, comparable with bacterial genes expressing together in operons. These higher, three-dimensional genomic structures, which regulate the accessibility of the genes through chromatin changes, may form through LINE-RNA interactions via Hoogsteen base pairing.¹⁰ We must come to consider the genome of eukaryotes as spatial networks of interactive elements to form regulatory platforms for clustered gene expression.

Although several studies had identified LINE1 as an essential factor for murine preimplantation development, the details of ‘how and what’ were unknown.¹¹ In 2017, a study published in *Nature Genetics* demonstrated that LINE1 activity regulates the chromatin dynamics and is essential for normal embryonic development in mice.¹² The report demonstrated that appropriate genome-wide LINE1 chromatin activation/silencing is required for early embryonic development. Embryos with activated LINE1 had greater chromatin accessibility and a larger nuclear volume, whereas embryos with repressed LINE1 had less chromatin accessibility. Here, the LINE1 system appears to function as a generic mechanism for gene regulation during immediate early embryogenesis. Thus, when normal epigenetic control over gene expression is not yet in place,

LINEs regulate the accessibility of the genes by modifying the chromatin.

ERVs

Earlier, in a series of papers, I argued that the origin of RNA viruses can be understood as genetically modified ERVs which acquired virulence genes and thus became disease-causing agents.²⁻⁴ The ‘VIGE-first hypothesis’ holds that RNA viruses have their origin in ERVs, and that ERVs were created for/with a purpose. ERVs are made of two genes, *gag* and *pol*, which are also found in all modern RNA viruses. This fact is also the most vital argument for why endogenous retroviruses are always interpreted as remnants of ancient genomic invasions of RNA viruses. The *pol* gene encodes a large protein with four distinct enzymatic activities: a protease, a reverse transcriptase, an RNase, and an integrase. To produce the individual proteins, the protease, which is synthesized first, proteolytically releases the other three enzymes from the precursor sequence. The transcribed, full-length ERV RNA then functions as a template for reverse transcriptase, the enzyme that catalyzes the synthesis of a double-stranded RNA-DNA hybrid.

Next, the RNase enzyme removes the RNA part, and the remaining single-stranded DNA forms a circular molecule. This circular single-stranded DNA serves as a template for the synthesis of a second DNA strand. The double-stranded DNA copy can now be put back in the genome with the help of the integrase enzyme. The position where this happens is determined by repetitive DNA sequences flanking the ERV element and/or by the sequence specificity of the endonuclease (integrase).^{13,14} Alternatively, the RNA molecule can be packed in a capsule consisting of three proteins, which are specified by the *gag* gene, and the whole thing looks very much like a virus. Why this packaging is necessary

is unclear, but it may prevent the RNA molecule from docking to the wrong places in the cell. On the other hand, the protein-coated viral-like particles may contain biologically active molecules which have to be protected and/or delivered to the right places. In other words, we are dealing with a subcellular transport system.

In 2018, two publications addressing this possibility appeared simultaneously in *Cell*.^{15,16} Neurons use a virus-like construct to pass on messenger RNAs that code for the building blocks of that virus-like construction. These building blocks are known as activity-regulated cytoskeleton-associated protein (ARC). Although the ARC protein was for a long time suspected to be involved in learning and memory processes, nobody knew how or why. ARC is homologous to the *gag* proteins, which are found in all RNA viruses and ERVs. Although ARC is required for synaptic plasticity and cognition, and mutations in this gene are linked to autism and schizophrenia, its biological function is largely undefined.

The publications in *Cell* now shed some light on this matter. Jason Shepherd and colleagues from the University of Utah, USA, transferred the ARC gene into bacteria, and observed that ARC proteins self-assemble into capsids which look very much like virus coats.¹⁵ The researchers concluded that that neuronal ARC gene encodes a repurposed retrotransposon *gag* protein that packages intercellular RNA to mediate intercellular communication in the nervous system. Purified ARC capsids are taken up and transfer ARC mRNA into the cytoplasm of neurons. Apparently, the neurons need ARC in such large amounts that they require a special delivery system. Furthermore, these results show that ARC exhibits molecular properties similar to those of retroviral *gag* proteins. Of course, the authors spun an evolutionary story

around their findings, claiming that ARC is derived from a vertebrate lineage of Ty3/gypsy retrotransposons. In a comment on a Dutch media site, Shepherd admitted: “Other neuroscientists would have laughed at me if I had claimed something like that before.” His response identifies the junk DNA hypothesis of the Darwinian paradigm as a science stopper, and shows that questioning junk DNA still induces scoff and laughter from a scientific community blinded by the erroneous idea that our genome is made of viruses.

In the same issue of *Cell*, a research group from the University of Massachusetts further disclosed another function of ARC proteins.¹⁶ They discovered that the motor neurons of fruit flies control muscles by releasing extracellular vesicles which are packed with ARC capsids. Here too, the ARC protein forms capsid-like structures. They bind dArc1 mRNA in neurons and they are uploaded into extracellular vesicles that are transferred from motor neurons to muscles. The more active the neurons are the more capsids are delivered. These results point to a trans-synaptic mRNA transport mechanism involving retrovirus-like capsids and extracellular vesicles. The paper also reports how cultured genetically modified mouse neurons, which do not express the ARC gene, integrated ARC capsids and started to use the delivered ARC mRNAs. Again, we see a sophisticated delivery system at work, not viruses. The researchers asked whether this form of transport may also play a role in the delivery of additional mRNAs and proteins, and perhaps may promote the spread of Alzheimer’s and other neurological disorders.¹⁶

Considering these novel facts, we are compelled to also ask whether the ERV system itself is some sort of common delivery mechanism, since ERV-like vesicles readily

leave and enter cells of the placenta. Unfortunately, nobody is really interested in studying this fascinating possibility. Still, it has recently been reported that ERVs can act as DNA regulatory elements^{17,18} as long non-coding RNAs,^{19,20} and as triggers for the innate immune system.²⁰ ERVs in the human genome are able to bind ‘signal transducer and activator of transcription’ 1 (STAT1), an effector of the interferon (IFN) pathway involved in immune responses. The enrichment of ERVs in IFN-regulated genes suggest that they play an active role as regulators of essential immune system genes.²¹

Conclusions

In biology, everything is regulated and controlled. Although we have only recently started to study truly the functions of TEs we have already found that they accomplish many crucial functions in regulating gene expression, differentiation, and development. About 10 years ago, I started to name TEs after their functions in the genome: variation-inducing genetic elements (VIGEs).^{2,3} In the light of current knowledge, this term still seems to be appropriate, although their functions now go far beyond inducing variation.

New studies keep providing unexpected functions for TEs, indicating they are an integral part of originally designed genomes, which we should refer to as *baranomes*.²² This is clear from the DNA-nucleosome binding rules that their sequences tightly follow²³ and by increasing evidence that the activity of TEs is tightly controlled by (epi) genetic mechanisms and specific RNA molecules.²⁴ It is outlandish to claim this intricate genetic system came about by an ancient invasion of RNA viruses. In my opinion, the mainstream opinion still has the order of events upside down: the genomes of the eukaryotes are not built of

remnants of RNA viruses. Rather, RNA viruses have their origin in the genome, and to be precise in ERVs. Life was created good; RNA-viruses and the diseases they induce first appeared after the Fall.

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Still another difficulty in using foraminifera to reconstruct secular paleohistories

Michael J. Oard

Oxygen isotopes have been used to infer climate change in sediments and sedimentary rocks. The ratio of $^{18}\text{O}/^{16}\text{O}$ depends on several variables, especially temperature and/or global ice volume.^{1,2} It is common to measure oxygen isotopes in the carbonate skeletons of the marine zooplankton, foraminifera (figure 1). Oxygen isotope analysis is one of the main methods secular researchers use to study thousands of deep-sea cores. Oscillations or variations in the oxygen isotope ratio are measured down the cores. It is from these measurements that researchers concluded there were 50 ice ages of variable sizes during the 2.6 Ma of the Quaternary.³ Therefore, it is important to understand the biology and taxonomy of foraminifera and be certain there was no contamination.

Foraminifera commonly altered

It has long been known that foraminifera can easily be subtly altered by carbonate dissolution or the addition of carbonate.⁴ Within a range of depths, the rate of carbonate dissolution exceeds the rate of calcite deposition. Hence, the shells can dissolve in the bottom water while sinking or within the top layers of the sediment on the bottom. Likewise, inorganic carbon dissolved in interstitial pore fluids is also thought to precipitate onto buried shells.

So, researchers have attempted to analyze what they think are pristine-looking shells. These pristine-looking,

believed well-preserved, shells can be translucent or opaque. To the consternation of the researchers it has been discovered by carbon-14 dating that the opaque shells are ‘older’ than the translucent shells by a considerable amount. Opaque shells have dated the last glacial maximum 8,000 to 15,000 years earlier than expected, and the deglaciation period 14,000 to 22,000 years earlier than expected. The ‘frostiness’ of the opaque shells is thought to be due to the post-depositional addition of calcite to the shells. This age offset is bad news for secular paleoceanographers, as the opaque shells are common in ocean bottom sediments and have been used for years to date climate events, since both types of shells look pristine. The frostiness in the opaque shells is visible in microscope images, but early diagenesis (changes leading to it becoming rock) can be missed:

“To complicate matters, early diagenesis is easily overlooked as it occurs on sub-micrometer scales without visibly altering the foraminiferal shell microstructures (Sexton *et al.*, 2006).”⁵

This post-depositional alteration of the foraminifera shells was discovered in ‘older’ sediments about two decades ago.^{6,7,8} This solved what was called the ‘cool tropics paradox’ in which the Cretaceous and early Cenozoic high-latitude climate, based on oxygen isotopes, was judged very

warm while the tropics were relatively cool. This does not make meteorological sense, so secular scientists needed to find a solution.

The change in the oxygen isotope ratio is thought to be due to burial compaction that causes interstitial fluids to diffuse upwards. This fluid contains bicarbonate ions with a higher oxygen isotope ratio which would bind with the foraminifera shells. Since higher oxygen isotope values are thought to indicate cooler temperatures, this effect ‘fooled’ researchers into thinking that the tropics were cooler than they ‘really’ were. However, a reanalysis showed that the tropics were warm during this period, and in some cases quite hot, thereby apparently resolving the paradox. However, researchers assumed that late Quaternary sediments would have been unaffected, as any alteration would have been negligible, due to a lack of time for such effects to occur:

“The prevalence of post-depositional diagenesis [alteration] among foraminiferal shells in geologically older sediments is well established ... but alteration of younger (late Pleistocene to Holocene) foraminifera is often considered negligible owing to their brief depositional history and shallow burial depths.”⁵

However, this new research shows that this effect can show up even in ‘younger’ sediments.

So, now researchers avoid the opaque shells, and use translucent shells, believed to remain uncontaminated by being surrounded by clay. But what about all the previous research that used opaque shells for past climate analysis?

Creationist implications

The implications of this research for creation scientists are that without accurate oxygen isotope ratios on foraminifera, some of the uniformitarian climate deductions for the Quaternary are bound to be skewed in some unknown way or outright wrong. At this point, it is unknown what far-reaching effect this new research may have.

It also calls into question the assumption that the late Quaternary was too young to be significantly contaminated with carbonate having a heavier oxygen isotope ratio. This could imply that there is actually very little real age difference between late Quaternary and the rest of the Cenozoic and Cretaceous.

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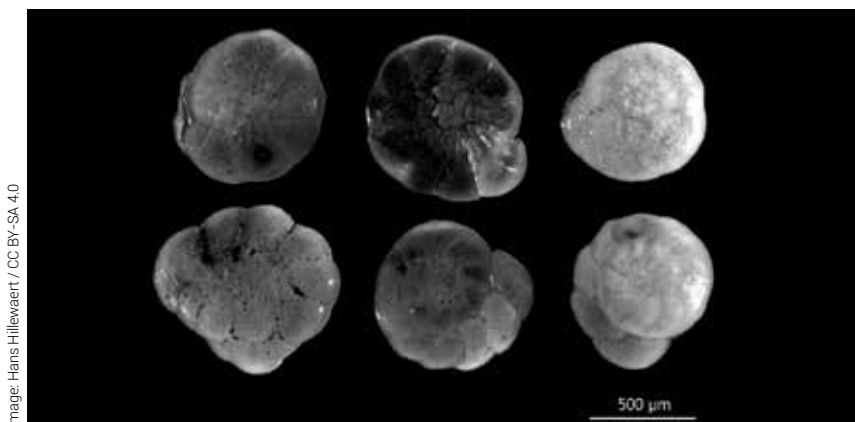


Image: Hans Hillewaert / CC BY-SA 4.0

Figure 1. Binocular micrographs of benthic, near-bottom, foraminiferans

Is it time to make human-chimp hybrids?

Jerry Bergman and Jeffrey Tomkins

Darwinism teaches that humans are simply another animal produced in the continuum of evolution. Researchers have produced many hybrids, even between two animals once classified as different species.¹ Some of the many examples include tigers, the offspring of a male tiger bred with a female lion. Ligers are the offspring of a male lion bred with a female tiger. A jaguar and a leopard mix produces a jagulep. A leopard and a lion produce a leopon. As far as known, all of the big cats can interbreed.² Many creationists would place most cats in a single cat ‘kind’, so these results that would surprise most people are well within a biblical framework of origins. The elaboration of creationist kinds (baraminology) and the paradigm of discontinuity in the continuum of life have been tackled at length previously.^{3–16}

Based on an evolutionary perspective that humans and chimpanzees are closely related, David Barash, Professor Emeritus of Psychology at the University of Washington, recently stated in a widely read blog, that it is “... by no means impossible or even unlikely that a hybrid or a chimera combining a human being and a chimpanzee could be produced in a laboratory. After all, human and chimp (or bonobo) share, by most estimates, roughly 99 percent of their nuclear DNA.”¹

He adds that the gene-editing tool CRISPR provides scientists with the ability of adding and deleting targeted genes. Consequently, “it is not unreasonable to foresee the possibility—eventually, perhaps, the likelihood—of producing ‘humanzees’ or ‘chimphumans’. Such an individual would ... be neither human nor chimp: rather, something in between.”¹⁷

He added: “Doing so would be a terrific idea” to quell the most harmful “theologically-driven myth of all times: that human beings are discontinuous from the rest of the natural world, ... specially created and endowed with souls, whereas ‘they’—all other creatures—were not.” Producing ‘chimphumans’ would be, Barash argues, the capstone proof of evolution. It would “drive a stake into the heart of that destructive disinformation campaign of discontinuity, of human hegemony over all other living things.”¹ This statement attacks the view that, as Genesis teaches, man is created in God’s image and to have dominion over the animals:

“Then God said, ‘Let us make man in our image, after our likeness. And let them have dominion over the fish of the sea and over the birds of the heavens and over the livestock and over all the earth and over every creeping thing that creeps on the earth’” (Genesis 1:26, ESV).

The chimphuman goal is important to some Darwinists because it “is almost impossible to imagine how the most die-hard advocate of humans having a discontinuously unique biological status could continue to maintain this position if confronted with a real, functioning, human-chimp combination”.¹ Barash concluded: “faced with individuals who are clearly intermediate between human and ape, it will become painfully obvious that a rigid distinction between the two is no longer tenable”.¹

A major mistake in the evolutionary reasoning of Barash is the error that “human and chimp (or bonobo) share,

by most estimates, roughly 99 percent of their nuclear DNA”. Evolutionists need close to a 99% similarity to make human evolution from an ape-like ancestor seem plausible within the last 3 to 6 Ma. However, even leading evolutionists disagree with this figure. Todd Preuss, a leading primate geneticist stated: “It is now clear that the genetic differences between humans and chimpanzees are far more extensive than previously thought; their genomes are not 98% or 99% identical.” Preuss then goes on to claim a 96% similarity for the alignable regions of the human and chimpanzee genomes.

In a reassessment of six different research papers comparing human and chimpanzee DNA that seemed to support a 96 to 98.5% similarity, Tomkins and Bergman discovered that large amounts of data had been omitted to achieve an outcome favourable to evolutionary expectations. In fact, when the amount of omitted non-aligning data was factored back into the estimates, overall genome similarities between humans and chimpanzees of 81 and 87% were obtained.¹⁸ These results were similar to a later study done using raw chimpanzee DNA sequences aligned onto human in which an overall DNA similarity of 85% was achieved.¹⁹ Clearly, the genome similarity between humans and chimpanzees is much less than the level needed to make human evolution from an ape-like ancestor plausible.

Professor Barash advocates creating a human-chimpanzee hybrid using biotechnology because he assumes its success will encourage humans to treat animals better, since the divide that now exists between humans and all lower forms of life, especially apes, will be reduced. In fact, such a scheme would likely have the opposite effect. If humans are just another animal, a different type of primate, it will likely influence them to further de-humanize other humans. After all, they are just

animals. This is exactly how Nazi Germany justified mistreating certain people, including Slavs, Jews, and Roma, that led to the Holocaust.⁵

David Barash is not a fringe scientist, but a leading researcher in evolutionary psychology and a popularizer of Darwinian ideas in general. He has written, edited, or co-authored 40 books and written over 230 scholarly articles. He is also a Fellow of the American Association for the Advancement of Science. And he is soon to be releasing a new book focused on promoting human evolution and the degradation of the status of mankind being created in God's image. The opening description of the book on Amazon.com states:

"Human beings have long seen themselves as the center of the universe, the apple of God's eye, specially-created creatures who are somehow above and beyond the natural world. This viewpoint—a persistent paradigm of our own unique self-importance—is as dangerous as it is false."²⁰

Emphasizing the importance that the academic establishment is placing on this effort are editorial reviews raving about the new tome from such evolutionary luminaries as Richard Dawkins, Michael Ruse, Michael Shermer, Louis Leakey, and Donald C. Johanson.

Efforts in the past

Prior to the modern era of transgenic technologies that allow the transfer of DNA between completely different organisms, human-ape breeding experiments had been tried.²¹ The first scientific attempt was in the mid-1920s at a laboratory then part of French Guinea in Africa. The work was done by a leading Soviet scientist, Professor Ilya Ivanovich Ivanov (figure 1). Ivanov was a world-famous breeder of hybrids specializing in the field of artificial insemination and the interspecific hybridization of

animals. His results were reported to be sensational, especially among horse breeders from many parts of the world.

Ivanov attempted, without success, to inseminate female chimpanzees with human sperm. He also attempted a set of experiments involving ape sperm and humans, but was unsuccessful for several reasons. He used Negro women because in his day they were believed to be biologically closer to apes, thus, he reasoned, the experiment would more likely be successful.²² This belief was based on the writings of Darwin and other evolutionists of the time period.

Darwin expected that, at some future point, "not very distant ... the civilized races of man will almost certainly exterminate and replace throughout the world the savage races", thus making the gap between humans and apes even greater than it is now.²³ Eminent evolutionist Professor

Carl Vogt "distinguished, as did most biologists in the second half of the nineteenth century, between crosses of 'allied' races [such as negroes and apes] and 'distant' ones, such as white humans and apes".²⁴ The scientists of that era believed hybridization of the alleged lowest human type and the highest ape type would vindicate Darwin and serve as powerful evidence of evolution.²⁵

Both the Scriptures and Christian history condemn these failed attempts based on evolutionary ideals. The Bible is very clear: "For not all flesh is the same, but there is one kind for humans, another for animals, another for birds, and another for fish" (1 Corinthians 15:39–40, ESV). While the Bible does not specifically address the practice of artificial insemination of humans with animals, multiple scriptures do command the death penalty for bestiality (Exodus 22:19; Leviticus

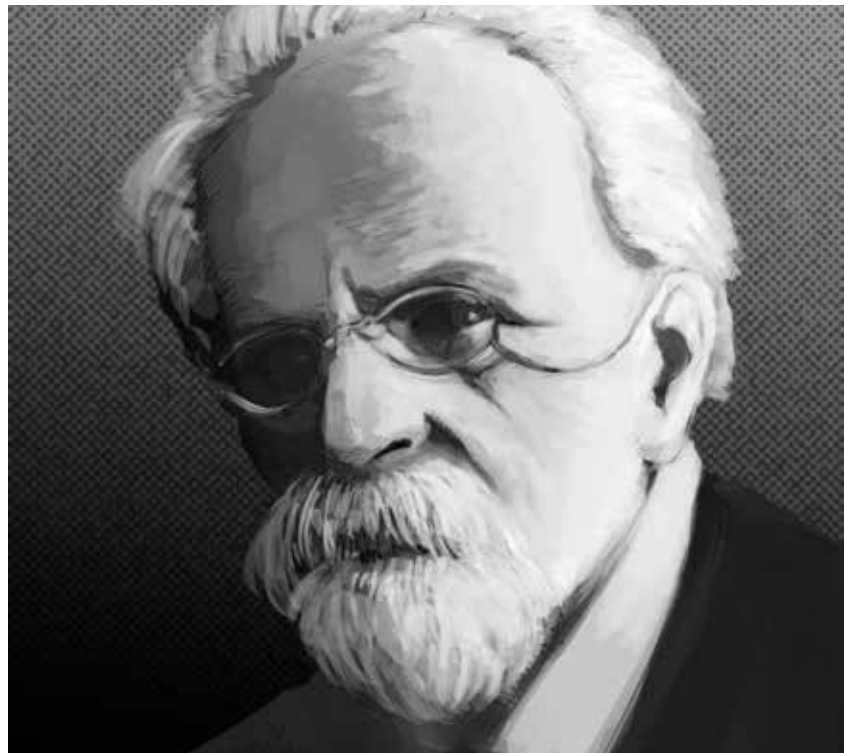


Figure 1. Soviet scientist Professor Ilya Ivanovich Ivanov was a world-famous breeder of hybrids, specializing in the field of artificial insemination and the interspecific hybridization of animals. He made extensive attempts at creating human-chimpanzee hybrids in the mid-1920s at a laboratory in French Guinea, West Africa.

18:23, 20:15–16; and Deuteronomy 27:21). Thus, it is not a moral stretch to apply this clear biblical restriction to the issue at hand in this article.

A real concern is the distinct possibility of using modern transgenic technology, such as the CRISPR/Cas9 genome engineering techniques²⁶ to transfer human DNA to chimp or vice versa that will ultimately further erode human value and encourage inhuman experiments. This is essentially what Barash is proposing, in the historical wake of the failed human chimpanzee hybridization studies promoted and performed by his early evolutionary forbearers. Now the morally warped dream of evolutionists is within reach, but will it really prove or substantiate evolutionary theory? The answer is a resounding ‘No’. Foreign DNA has been transferred across the eukaryotic kingdom of life by scientists since the 1980s using earlier transgenic techniques. The very fact that such complicated technologies have had to be used to accomplish the integration of diverse genomes outside of traditional interbreeding is actually confirmation of the concept of the discontinuity of life, an idea directly associated with biblical kinds described in the opening chapter of Genesis.

In that Barash admits humans and chimpanzees cannot hybridize and that the only recourse is to use transgenic technologies, he is unwittingly debunking the evolutionary myth of close human-ape relatedness and evolutionary continuity that he wishes to promote. Clearly life is discontinuous as the Scriptures describe with humans being especially unique as being created in God’s image.

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Cosmology's fatal weakness—under-determination

John G. Hartnett

Can we definitively know the global structure of *spacetime*? This is a good question. It is one that is actively discussed within the area of the philosophy of modern physics.^{1,2}

The problem of underdetermination

However it is a question that highlights the fundamental weakness of cosmology and hence of cosmogony. (Cosmology is the study of the structure of the cosmos whereas cosmogony is the study of the origin of the universe.) That weakness is the inherent inability to accurately construct any global cosmological model, i.e. a model that accurately represents the structure of the universe at all times and locations. The reason for this is *underdetermination*.³

“There seems to be a robust sense in which the global structure of every cosmological model is underdetermined.”¹

In the philosophy of science, underdetermination means that the available evidence is insufficient to be able to determine which belief one should hold about that evidence. That means that no matter what cosmological model one might conceive of, in an attempt to describe the structure of the universe, every model will be underdetermined. Or said another way, no matter what amount of observational data one might ever (even in principle) gather, the cosmological evidence does not force one particular model upon us. And this underdetermination has been rigorously proven.¹

This fact highlights what has been said before by some cosmologists:

“Cosmology may look like a science, but it isn’t a science. ... A basic tenet of science is that you can do repeatable experiments, and you can’t do that in cosmology.”⁴

The study of the universe is not subject to rigorous experimentation where one systematically narrows down (by disproof of other theories) a unique description. This might be done in a laboratory where one can interact with the subject being examined.⁵ But in cosmology this is not possible. This then is cosmology’s major and fundamental weakness when we want to determine not only the structure of the cosmos but its origin.

It is a historical science that tries to reconstruct a history of the universe.

“... cosmology for the most part treats our current accepted physical theories as ‘given’. For it is, like geology, a *historical science*: and as such, it aims to provide, not a general theory, but as detailed as possible a history of its topic—the universe [emphasis added].”²

Cosmology (and cosmogony) can still make predictions and reject failed theories but the field is much weaker than experimental science because one has no direct access to the past, which in philosophical terms means it has an epistemological problem. How can we definitively know which model is the correct one?

Starting assumptions

Philosophy is an important part of any science, and all scientists require some starting assumptions. However one might be forgiven if one thought that cosmology has no such assumptions. The fact is, though, that cosmology does require assumptions else one could not proceed to even construct a basic model of the universe.

The standard big bang cosmology uses one important assumption in an

effort to reduce the underdetermination and hence develop a mathematical description of the cosmos at all past times. This assumption is called the *cosmological principle*, also known as the principle of uniformity.⁶

One statement of that principle is that the laws of physics determined locally are applicable throughout the universe, and that the structure of the universe on the largest scales at the same epoch (or time in the history of the universe) is the same regardless of location. However despite this unprovable assumption the general epistemological difficulties as stated above still remain.

This means that no matter which cosmology is being promoted, there are an undetermined number of other possible models that can also account for, or are consistent with, the same observational data (figure 1). As proven by philosophers Malament,⁷ Manchak¹ and others:

“... the theorems say that in almost every spacetime obeying *general relativity*, no observer, however long they live, could accumulate enough observations to exclude their being in another very different spacetime.”²

Even if we attempt to narrow the field, by assuming as a given that *general relativity* is the correct physics for our universe, it still does not help much because general relativity allows for a plethora of cosmological models. As philosophers of science have pointed out:

“... due to structure internal to the theory itself, [general relativity] does not allow us to determine which of these models best represents our universe.”¹

This is underdetermination.

Under the assumption of the cosmological principle the standard Λ CDM big bang cosmological theory has become the dominant theory in the field. Only a few other dissenting theories are even considered and they are still cousins to the standard model.

Alternative cosmological models

The standard model has led to what some call ‘new physics’, but what I call *fudge factors*—for example, cosmic inflation,⁸ dark energy,⁹ and dark matter.¹⁰ However, it is important to note that there are other cosmological models consistent with our observations which do not require these fudge factors.

“But now the cat is out of the bag!

The point here is that the Λ CDM model being the best fit of the standard model does not imply, of course, that it is the unique best fit model. And there is considerable evidence that the observations we have made so far can be equally well fitted by Lemaitre–Tolman–Bondi [LTB] spherically symmetric inhomogeneous models—without, one might add, the all-too-conjectural dark energy of the Λ CDM model.”²



Figure 1. Like the story of the blind men, each getting a different interpretation for the same elephant they examine, there are many different theories/models in cosmology/cosmogony that could account for the same astronomical observations. (The analogy here is not perfect but gives you an idea).

The LTB inhomogeneous model does not assume the principle of uniformity (homogeneity and isotropy) but it still assumes a spherically symmetric matter distribution, which means the assumption of isotropy⁶ only. From the perspective of the physics, one could say that the LTB model is a better description of the universe because it does not require the addition of *dark energy*, some hypothetical stuff that is unknown to modern physics.

And *cosmic inflation* was introduced to solve, *inter alia*, the *flatness problem* and the *horizon problem*. As a result the standard Λ CDM model could be rescued. But at what price?

“... one buys a satisfying explanation of a ‘late’ feature of the universe [dark energy], by paying the price of a speculative piece of physics for very early times [inflation].”²

The success of the LTB model without the assumption of homogeneity implies then that the assumption of uniformity cannot be justified. Without the cosmological principle, most cosmological theories would be intractable. There would be no way to reduce the myriad of potential possibilities. Probably more than 95% of all models assume it, even the LTB model assumes the isotropic aspect of it. And the success of the LTB model does not of course mean that it is the unique description of the universe that cosmologists seek.

Stating what I believe is obvious, the Bible describes a creation history wherein there must have been supernatural physics (creation of matter out of nothing) that simply is not known to physics today. After creation was finished, God has rarely used such a power again.¹¹

Stephen Hawking claimed that the existence of gravitation implies that the universe came into existence from nothing—absolutely nothing.¹²

“‘Because there is a law such as gravity, the universe can and will

create itself from nothing’, he writes. ‘Spontaneous creation is the reason there is something rather than nothing, why the universe exists, why we exist.’”

The universe did not create itself out of nothing, despite Hawking’s faith claim. The Creator, who has existed eternally, was the source of creation out of nothing. However that could not have involved standard physics, or some as-yet-undiscovered quantum physics or some description of the alleged big bang singularity.¹³ In the realm of known physics, matter does not come into existence from nothing. Matter can be formed from energy, but that is always pre-existing energy in the universe.

Conclusion

The take-home message here is that even assuming that general relativity applies to the whole universe, one is still left with an indeterminate choice of potential models that could describe the structure and hence history of the universe. And some of those models may have not yet even been conceived of. This is due to the fundamental underdetermination of cosmology. This means that cosmological observations will never force us to accept the big bang. It is important to know that the biblical account of the creation of the universe will always remain consistent with everything that we observe in the universe.

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6. The cosmological principle involves the assumption of homogeneity (there is no special place in the universe, so on a large enough scale, for all points at the same time, the universe appears the same at every location) and isotropy (there are no special directions, so the universe appears the same in every direction for all observers regardless of their location).
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Dinosaur classification in a tumult

Michael J. Oard

I have often wondered which characteristics biologists and paleontologists use to classify present-day and fossil organisms. I learned early that dinosaurs were classified by their hip bones. From this they were divided into two major groups: the lizard-hipped dinosaurs, the Saurischia, and the bird-hipped dinosaurs, the Ornithischia.^{1,2} This classification has lasted over 130 years. The two major branches within this classification supposedly evolved from a common ancestor. Then the lizard-hipped dinosaurs diverged into the sauropods and theropods (left side of figure 1).

However, many scientists have disputed this classification, declaring it to be an oversimplification and probably wrong.^{3,4} For instance, ornithopods had a lot of characteristics similar to theropods, such as being bipedal. Moreover, there were many differences between sauropods and theropods, such as their eating habits and walking pattern. Sauropods were quadrupedal herbivores, while theropods were bipedal carnivores. Theropods, which supposedly gave rise to birds, are classified with the lizard-hipped dinosaurs. Herrerasauridae were also difficult to classify. Sometimes they were even classified

outside Dinosauria.⁴ Herrerasaurids are among the earliest dinosaurs found in the Late Triassic of South America. Moreover, ornithischians such as the stegosaurs, ceratopsians, and ankylosaurs have a unique anatomy. Padian says they are weird.⁵ They are missing in what are considered the oldest Late Triassic rocks but are widespread in the Jurassic and Cretaceous.

Dinosaurs no longer classified according to hips

Recently, this classification system has been turned on its head. Hips are no longer the most important variable. Affecting this change was a stunning research project that was done at the University of Cambridge by a Ph.D. student, co-authored by his two thesis advisors. The results have also been widely reported, including in the *New York Times*.⁶ Mr Baron, the author of this study, scoured museums for three years. Using a computer program called TNT, he chose 457 ‘diagnostic’ anatomical features of the bones, analyzing 32 billion family trees or combinations of traits. This new classification claims to have built the best possible tree. It objectively compares simple morphological variables in a procedure called cladistics. The new classification system is radically different from the old:

“The results of this study challenge more than a century of *dogma* and recover an unexpected tree topology that necessitates fundamental

reassessment of current hypotheses concerning early dinosaur evolution, palaeoecology and palaeobiology [emphasis added].”⁷

The procedure supposedly has no assumptions. However, Padian points out that one has to decide what is a convergent feature⁸ (i.e. one having nothing to do with common ancestry) and which feature has evolutionary value.⁴

The cladistics analysis resulted in placing theropods with ornithischians and placing sauropods with the questioned taxon, Herrerasauridae (right side of figure 1). This is a puzzling aspect of the cladistics analysis as stated by Padian:

“Also puzzling is Baron and colleagues’ finding that the primitive-looking herrerasaurids, from the South American Triassic, are the sister group of the sauropods. This line is not strongly supported, but it is intriguing. Herrerasaurids were carnivores, and they are usually linked to or included within the carnivorous theropods.”⁹

Baron *et al.* simply suggest that the above classification is an example of the independent evolution of the same trait, known as convergent evolution. A similar issue occurs with carnivory, which would have evolved independently in herrerasaurids and theropods.

The results will be controversial, but the analysis used the largest database in the world. Baron *et al.* charge that previous cladistics analyses were flawed. As a result, they had to

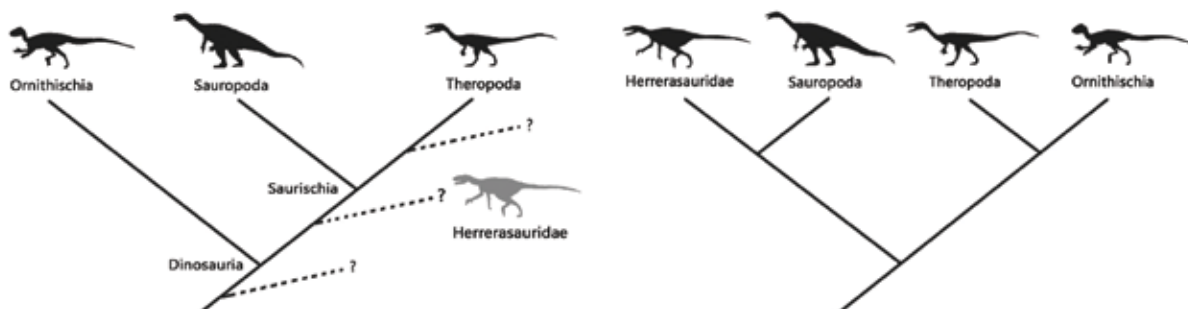


Figure 1. The traditional dinosaur evolutionary tree (left) and the revised dinosaur evolutionary tree⁴

incorporate different traits and refrain from using others. Padian suggests that scientists may have to accept the new classification, but he warns that critics will carefully scrutinize the trait analysis, which seems subjective and open to circular reasoning. A rigorous analysis of why some traits were used and others were not has not been published, but it is required.¹⁰

Origin of dinosaur problems

Fossils of dinosaurs are said to be as old as 230 Ma, but the new cladistics analysis indicates that the origin of dinosaurs would have been about 247 Ma. The original dinosaur was thought to have been small and bipedal with grasping hands, but the new analysis questions this:

“However, a number of key issues remain hotly contested, including the ancestral dinosaur’s body plan, size, stance, method of locomotion and diet, as well the clade’s center of origin.”¹¹

The authors also suggest that dinosaurs may have originated in the Northern Hemisphere and not in the Southern Hemisphere as widely believed.

Creation science implications

Looking back at the previous classification, Baron *et al.* can now say that ever since the classification system was developed in 1888, researchers have simply assumed it to be true and used it to classify, relying on its numerous assumptions:

“... but those studies that concentrated on the earliest divergences within a clade have been limited to include only a handful of the relevant taxa and incorporate numerous a priori assumptions regarding the relationships within and between the higher taxonomic groups.”⁷

The new result shows how arbitrary the previous classification system was, and it reveals that even

cladistics analysis can be manipulated to favour the consensus. The addition of new variables or reanalyzing old data can sometimes result in very different results, as Padian is quoted as saying: “It shows that with just a slightly new analysis you can overturn results.”¹⁰

The origin of dinosaurs is still a problem for the evolutionary model; it does not explain the large gaps between dinosaur types.

Deciding which traits are convergent and not to be included in the cladistics analysis and which traits are of evolutionary importance still appears to be a subjective exercise and open to circular reasoning. This is demonstrated by the claimed evolution of small grasping hands in bipedal dinosaurs and by the multiple origins of both carnivory and herbivory.

It is still safe to conclude that dinosaurs were specially created, and that they defy an evolutionary sequence or classification. Each kind is unique with distinctive properties, some of which may also have been created in other kinds. Dinosaurs represent an orchard of life, with variation among multiple created kinds, and not a tree of life.

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Creationist modelling of the origins of *Canis lupus familiaris*—ancestry, timing, and biogeography

Cody J. Guitard

Much work has been done by evolutionary scientists attempting to trace the origins of *Canis lupus familiaris* (domestic dogs). While many insights from this research are helpful, there are good scientific reasons to reject the proposed timeframe for the domestication of wolves (*Canis lupus*), the proposed phylogenetic relatedness of the Canidae family to other families in the evolutionary tree, and the use of variation within domestic dogs as evidence for the evolution of canids from the same common ancestor as all other living things. In contrast, inferences from the historical biblical texts provide a better model for the biological variation observed within domestic dogs and other canids, as well as for potential timeframes and geographical locales of initial (post-Flood) domestication of wolves into dogs. In light of biblical chronogenealogies used in dating the Flood and Babel events, initial post-Flood domestication would have taken place c. 2,521–2,200 BC. Possible narrower date ranges as well as geographical locales of initial domestication are given in light of different sets of assumptions concerning the chronology of biblical events and interpretations of the current scientific data.

It is commonplace for people to mistakenly think of dog breeds as different species, though all dog breeds are in fact the same subspecies—*Canis lupus familiaris*, the domestic dog. Researchers recognize that most of today's more than 400 breeds of domestic dogs have only arisen in the past 200 years or so as the products of artificial selection.¹ With the sequencing of the entire domestic dog genome,² researchers are increasingly aware that the genome contains enormous built-in potential³ for the astounding variety observed among the different breeds.⁴ Researchers are hopeful that understanding the mechanisms that cause such variety in domestic dogs will assist in better understanding variation in other species.⁵ Evolutionary and creationist scientists are in agreement that domestic dogs originated via domestication of a wolf-like creature (see figure 1).⁶ In fact, domestic dogs and wolves belong to the same biological family (Canidae) as foxes, coyotes, jackals, dingoes,⁷ and other dog-like mammals,⁸ and it is widely agreed that at least the domestic dog and the wolf are the same species.

Evolutionary model for domestic dog origins

Evolutionary researchers believe that the lineage leading to the order Carnivora (carnivores) of the class Mammalia (mammals) would have originated about 83.1–96.2 million years (Ma) ago.⁹ According to the supposed evolutionary history of the Canidae family, the order Carnivora diverged to form the suborders Caniformia, or Canoidea, and Feliformia, or Feloidea, about 62.3–67.5 Ma ago.⁹ The

suborder Caniformia then gave rise to the Canidae family about 57.0–65.4 Ma ago.⁹ While this modern classification scheme—the proposed dating notwithstanding—can be useful in some ways, it is important to keep in mind that it is man-made and largely reflects the *assumption* of evolutionary relatedness of all life.

As previously mentioned, the canids consist of domestic dogs, wolves, foxes, coyotes, jackals, dingoes, and other dog-like mammals, all of which are agreed by evolutionists and creationists to share a common wolf-like ancestor.¹⁰ This is demonstrated by DNA comparisons¹¹ and the ability of the canids to hybridize (e.g. dog-wolf,¹² dog-coyote,¹³ dog-jackal,¹⁴ dog-dingo,¹⁵ dog-fox,¹⁶ coyote-fox,¹⁷ coyote-wolf¹⁸),¹⁹ oftentimes producing fertile offspring—perhaps, one might suggest, rendering their *Canis lupus* subspecies classifications trivial. (See figures 2–4 for hybrid examples.) It is entirely possible that following the initial domestication, domestic dogs freely hybridized not only with wild wolves but also with other canids.²⁰ Creationists do not contest this scenario.

Timing of initial domestication

As to when the initial domestication of wolves into dogs took place, different studies have yielded different results. Research involving mtDNA sequencing has led researchers to suggest dates ranging as early as 100,000 years ago²¹ to as late as 5,400 years ago,²² while dog-like fossils have been dated to as early as 31,700 years ago.²³ Recent evolutionary research indicates that initial dog-wolf divergence in particular occurred somewhere within 27,000–40,000 years



Figure 1. Despite the enormous variety among the many breeds of domestic dogs, they are indeed the same subspecies and all share a common ancestor in a wolf-like creature.

ago, though domestication may only have taken place thousands of years later, probably at numerous independent times and geographical locations.²⁴ It is widely accepted that domestication had occurred by the time of the Agricultural Revolution around 10,000 years ago by evolutionary estimates.²⁵ Most archaeologists and palaeontologists believe that relatively tame scavenger wolves around human hunting camps were first domesticated as camp guards and later as hunters sometime around the end of the Pleistocene epoch—the time period spanning the world’s most recent ice age according to uniformitarian geology—which ended around 11,700 years ago.²⁶ As one group of researchers describes:

“First, a founder group of less-fearful wolves would have been pulled toward nomadic encampments to scavenge kills or perhaps salvage wounded escapees from the hunt. Thereafter, these wolves may have found utility as barking sentinels, warning of human and animal invaders approaching at night. Gradually, natural selection and genetic drift resulting from human activities began to differentiate these wolves from the larger autonomous population. Once people had direct interaction with wolves, a subsequent, ‘cultural process’ would have begun. Suitable ‘preselected’ wolf pups taken as pets would have been socialized to humans and unconsciously and unintentionally selected for decreased flight behaviour and increased

sociality, 2 trademarks of tameness. Eventually, people established control over proto-dog mating. From this point forward the wolf in effect became a dog, under constant observation and subject to strong artificial selection for desired traits.”²⁷

While this story is speculative, it is also entirely plausible. In fact, such a scenario—with the additional note that animals were designed with domestication potential—would fit very well within any one of the possible creationist models (see below) for initial post-Flood domestication. Even the idea of increasingly tame scavenger wolves that would approach villages to feed on human prey parallels the predatory behaviour attributed to dogs in the Bible (see 1 Kings 14:11, 16:4, 21:19, 23–24, 22:38; 2 Kings 9:10, 36).

Geographical region of initial domestication

The geographical region in which wolves were first domesticated into dogs has been the subject of much study and disagreement among evolutionists. Until recently, there have usually been two suggested candidates for the point of origin for the domestication of wolves into man’s best friend: Europe²⁸ and East Asia.²⁹ Now, however, in light of recent advancements in mtDNA sequencing, many evolutionary scientists are beginning to think that perhaps the answer to the question of the origin of domestic dogs is not either Europe *or* East Asia, but both Europe *and* East Asia. That is, that dogs were domesticated from two separate wolf populations—one in Europe and one in East Asia.³⁰ However, contrary to earlier mtDNA sequencing data, newer research results give the impression that domestication of wolves first occurred somewhere in the Middle East.³¹ In short, an increasing number of researchers are coming to think that initial domestication took place in several independent geographical regions at different times. As will be discussed later, the proposed geographical regions are no issue for creationist modelling.

Critique of the evolutionary model

Theories in the evolutionary literature concerning the relatedness and variation *within* the Canidae family, the geographical region(s) for initial domestication of wolves, and the reason(s) why humans sought to domesticate wolves in the first place fit well within the creationist model (explained later). However, there are several major problems with the broader evolutionary model concerning the use of domestic dog variation as evidence for the general theory of evolution (the common ancestry of all living things),³² the alleged common ancestry of the canids with other family groups within the Carnivora suborder, and the timing of initial domestication of wolves into dogs.



Figure 2. A grey wolf



Figure 3. A wolfdog (dog-wolf hybrid)



Figure 4. A coywolf (coyote-wolf hybrid)

Intra-kind variation, not evolution

Evolutionists like to present the rapid diversification of domestic dogs as a supposed observation of evolution in action.³³ However, this is a clear case of equivocation, for the variation observed in dogs is not the same kind of change necessary for molecules-to-man (or, more appropriately here, molecules-to-dog) evolution. Functional and phenotypic differences which distinguish the various breeds of domestic dogs are not the products of evolution—which requires the creation of new genetic information³⁴—but the selection, manipulation, and mutation of *pre-existing* genetic information. Artificial selection actually *depletes* the genetic potential in the gene pool, rendering each generation of offspring less adaptable than the previous ones to future environmental changes.³⁵ While these data are in no way evidence for evolution, they do fit well within the young-earth model, wherein the basic created canid kind or type has a pool of genetic potential for intra-kind variation, but not inter-kind variation.³⁶

The transitional forms are missing

A major problem with the evolutionary story of the origins of domestic dogs lies in the lack of transitional forms in the supposed phylogenetic history of the Canidae family linking it with other families.³⁷ For example, transitional forms are missing to account for the alleged divergence of the Canidae family from the Mephitidae family, which is also classified under the suborder Caniformia. Furthermore, there are no transitional forms suggesting common ancestry between the suborders Caniformia and Feliformia. The revealing words of zoologist Austin H. Clark, written nearly a century ago, still ring true today:

“... gaps are found in all these evolutionary lines, and many of these gaps appear to be real—that is, they were never, so far as we have been able to learn, bridged by so-called missing links. To take a concrete example, it is quite obvious that the gap between cats and dogs is broad, and it remains broad throughout the fossil record. Cats never became dogs, nor dogs cats; but both are carnivorous mammals.”³⁸

Much of the data interpreted as evidence for evolutionary common ancestry come from studies of physiological and genetic homologies in the animal kingdom, though these are much better interpreted as evidence of common *design* rather than common *descent*.³⁹ The evidence used by evolutionists for proposing hierarchies of common descent is similar to what creationists use for placing different species within the same created kind, but the evolutionists need changes of one type of feature (e.g. an arm) into another type of feature (e.g. a wing) resulting from the naturalistic introduction of novel genetic potential into the organism’s genome, which is a type of change far beyond anything known of how organisms

actually change. In the end, multiple lines of evidence suggest that the canids are their own separately created kind with vast potential for intra-kind variation.⁴⁰

Determining initial domestication time

One problem with evolutionary estimates for the time of initial domestication is that the methods used rely on numerous, unfounded assumptions. For example, the estimates from mtDNA analysis—the most common tool used for reconstructing historical patterns of biogeographical distribution and speciation—are questionable due to the unknown extent of the effects of direct and indirect selection on mtDNA.⁴¹ Furthermore, mtDNA analyses assume a uniform mutation rate throughout the genetic ancestry of the species, though it is known that mutation rates can either speed up or slow down due to outside influences,⁴² including environmental factors.⁴³ It has also been shown that certain animals, including dogs,⁴⁴ experience significant changes in their mtDNA patterns as a result of domestication over a short timescale.⁴⁵

The reliability of other methods used for dating the initial domestication is also questionable. One example is osteometry, the measurement of skeletal remains, which has been a favourite tool in the study of early dog domestication. There are a number of interpretive issues that need to be accounted for.⁴⁶ One of the predominant issues with this method is that the reported results of such research in the literature are inconsistent due to a lack of standardization in the methodologies being used. One research group made a revealing discovery:

“As the field [of forensic anthropology] has continued to develop more quantifiable methodologies for analysis, it has also come to more consistently rely upon the use of osteometrics; a method which has long been assumed to have been standardized. In order for osteometrics to be truly classified as being ‘standardized’, it must be standardized in practice as well as in the literature. In other words, one would expect that at least 80% of practitioners take the same measurement consistently, yielding physical measurements which differ only slightly. However, for the measurements tested, this study has demonstrated that, at best, 63% of practitioners consistently take a given measurement, with every other measurement yielding lower levels of consensus. It has also been demonstrated that there are many plausible factors to the current lack of standardization in osteometrics including the presence of several vague and discrepant measurement descriptions in the authorized texts which then results in a lack of standardized osteometric training. As some of the lowest consistency rates were found in the more experienced groups, it could

also be inferred that any interobserver disparities in measurement style could be passed on through education to future generations of anthropologists, thereby perpetuating the problem.”⁴⁷

The researchers go on to suggest that in order to improve the current level of standardization, all published osteometric data ought to be re-examined, all methodologies ought to be re-assessed, and a comprehensive guide to osteometry ought to be re-issued. Similar issues regarding interpretation and inconsistent datasets, as well as frequent sample contamination, also arise in ancient DNA (aDNA) studies.⁴⁸

Furthermore, as has been pointed out numerous times in the creationist literature, there are also issues with radiometric dating, the most commonly used dating method by evolutionists, which is based on several unprovable assumptions. One commonly used in the analysis of canid remains is radiocarbon (¹⁴C) dating. However, like all radiometric dating methods, radiocarbon dating relies on three unprovable assumptions: (1) the initial number of parent and daughter isotopes is known; (2) there has been no contamination (i.e. the system is closed); and (3) the rate of decay has been constant. There are, in fact, many good scientific reasons to doubt and even reject each of these assumptions.⁴⁹ However, if one had a reliable historical record providing data on any of these factors, this would then provide a starting point for making an accurate assessment of a sample’s decay history. For example, many do not realize that when considered through the lens of biblical history, radiocarbon dating actually supports the young-earth creationist model. Nuclear physicist Jim Mason argues that a number of factors (pre-Flood conditions, burial processes during the Flood, etc.) would account for the inflated dates derived from decay measurements:

“These factors would act to make the ratio of ¹⁴C to ¹²C in the pre-Flood world much smaller than it is today (less ¹⁴C, more ¹²C). Also, the intense volcanism associated with the Flood (there is a huge amount of volcanic material in the rocks that would have been formed during the Flood) would have dumped billions of tons of non-radioactive carbon into the atmosphere, further diluting any ¹⁴C that may have been present. Thus, after the Flood, the ratio of ¹⁴C to ¹²C would have to increase to reach today’s levels, meaning anything alive in the years immediately after the Flood would have a radiocarbon age much older than reality. Accounting for this could easily put the calculated time since burial at 4,500 years for even the ‘oldest’ samples.”⁵⁰

The timescale intrinsic to this model will be further developed and will highlight the place of initial post-Flood dog domestication in the model in the next section.

The problems with all of the dating methods discussed have led numerous evolutionary scientists to question many,

if not most, conclusions of previous research into the history of domestic dogs and to seek a major reassessment through new and improved techniques, especially through newly developing DNA sequencing technology.⁵¹ The best possible data, however, for dating and determining the geographical location(s) of the initial domestication of wolves would be a reliable written historical record. As will be shown, some very helpful historical insights can be gleaned from the biblical record concerning domestic dogs.

Biblical time window for initial domestication

Biblically, depending on certain textual and interpretive assumptions, the year of creation can be placed between 5,665 and 3,822 BC,⁵² although a strong case can be made for a creation date of $4,178 \pm 50$ BC.⁵³ God did not create all species that have ever existed but instead created basic kinds (Gen. 1:11, 12, 21, 24, 25; basic types which have diversified into what are today recognized as families or even higher taxonomic categories).⁵⁴ He endowed each kind with the ability to produce all the intra-kind variation observed today.⁵⁵ Then, in c. 2,522 BC (assuming the creation date of $4,178 \pm 50$ BC),⁵⁶ God sent a global Flood (which lasted about one year) that killed “everything on the dry land in whose nostrils was the breath of life” (Gen. 7:22) that was not sheltered in Noah’s Ark (Gen. 15).

No domestic dogs on the Ark

Noah did not take every single species which existed at the time into the Ark, but rather representatives of each of the created kinds (Gen. 6:20; 7:14).⁵⁷ While there may have been some domestic dogs before the Flood, the current data yields no certainty. The search for pre-Flood domesticated dogs would need to be limited to strata produced during or prior to the Flood, though the geological boundaries bookending the start and end of the Flood are heavily debated among creationists.⁵⁸ Even if some of the dog-like creatures in the fossil record were identified with certainty as being pre-Flood, it is difficult to determine based solely on fossil remains whether any were domesticated. Since the ancestry of domestic dogs is traceable to something like a grey wolf, there would not have been any members of *Canis lupus familiaris* on the Ark. Instead, there would have been a pair of wolf-like creatures with all the genetic information necessary for the variations observed within the canid kind post-Flood. As Jonathan D. Sarfati notes: “Creationists have often pointed out that Noah didn’t need to take wolves, foxes, coyotes, dingoes, chihuahuas, great danes, spaniels, dachshunds, etc. on the Ark, because it was sufficient to take a pair of wolf-like creatures with all the potential for diversifying into different varieties.”⁵⁹ He adds: “evolutionists now concede that domestic dogs came from wolves only a

few thousand years ago, and are not really very different, although they insist on calling this ‘evolution’.”⁶⁰

Early biblical-historical reference to domestic dogs

There are numerous references throughout Scripture to dogs, but the two which provide the clearest references to literal, *domesticated* dogs are given in Matthew 15:27⁶¹ and Job 30:1.⁶² Job is possibly the oldest book of the Bible, recording events that took place sometime after the Flood (Job 22:16) in the Middle-Eastern land of Uz (Job 1:1)⁶³—which was likely the land that would later become Edom (cf. Lam. 4:21)—and around the time of the Jewish patriarchs.⁶⁴ Job’s contemporaneity with the patriarchs is evident from a number of characteristics of his time, including but not limited to the facts that his wealth was measured in livestock (Job 1:3, 42:12); he offered up sacrifices on his own behalf and for his family (Job 1:5, cf. 42:8), just like the Jewish patriarchs (Gen. 8:20, 12:7–8, 31:54), with no hint of the existence of the Levitical priesthood or temple; he gave his daughters “an inheritance among their brothers” (Job 42:15), unlike the Israelite law in which daughters only received an inheritance in the absence of sons (Num. 27:1–11, 36:1–13); and the longevity of his life—implied by the vastness of his pre-suffering accomplishments (Job 1:3–18), his post-suffering accomplishments (Job 42:10–13), and the fact that he only died 140 years after his sufferings (Job 42:16–17)⁶⁵—is more comparable to those of the patriarchs who lived c. 2,200 BC. All of this indicates that the first domestic dogs originated not long after the Flood and at least as early as c. 2,200 BC, providing an approximately 300-year window between c. 2,521 BC (the end of the Flood) and c. 2,200 BC for initial post-Flood domestication of wolves into dogs to occur.

Further insights and biblical modelling

Speciation and specialization would have occurred at much faster rates during the period of the post-Flood Ice Age⁶⁶ in which animals and humans alike would be subjected to a harsh environment, nutrient limitations, migratory isolation, and small inbreeding populations.⁶⁷ The specializing effects of even a single mutation are well-documented in the diversification of domestic dogs, so it is no stretch to posit that mutations coupled with the isolation of small, inbreeding migratory groups in the harsh post-Flood environment would have provided all the tools necessary for post-Flood humans to domesticate dogs through artificial selection. What is more, modern experiments on the domestication of wolves show that if constant human interaction begins when the wolves are newborn pups, the pups quickly begin to demonstrate some behavioural traits characteristic of domestic dogs, including

dependency on a human caregiver, though they are still prone to the aggressive behaviour and avoidance common among wolves.⁶⁸ Nonetheless, this would seem to indicate that consistent domestication practices could produce tame and eventually fully domesticated canids within relatively short amounts of time.⁶⁹

Combined with the fact that most of today's more than 400 dog breeds are known to have arisen in the past 200 years or so, it is reasonable to suggest that domestication of wolves into dogs could have taken place within the approximately 300 years between c. 2,521 BC (the end of the Flood) and c. 2,200 BC (the estimated time of Job). This would place the time of initial post-Flood domestication right in the first half of the 700-year-long Ice Age during which ice accumulation took place in the first 500 years following the Flood, followed by 200 years of relatively rapid deglaciation.⁷⁰ Biblical dating therefore indicates that domestication took place within the first 300 years or so of ice accumulation, which rendered the post-Flood environment increasingly harsh for survival. Though the Scandinavian ice sheet and mountain ice caps were farther north than the geographical locations discussed in Genesis, it is evident that people in the Middle East were still experiencing abnormally cold periods at the time (Job 38:29–30). If humans initially domesticated wolves for hunting purposes as researchers suggest, this would make perfect sense within the biblical framework as only after the Flood did God give permission to mankind to kill animals for food (Gen. 9:2–3)⁷¹ and, in the increasingly challenging post-Flood environment, man could have used a hunting partner.

Timing of post-Flood dispersion from Babel

As for the geographical location(s) of initial post-Flood domestication, there are two possibilities depending on which assumptions are made. These assumptions are based around the timing of the Babel event which would in turn inform the timing of initial domestication. In light of God's post-Flood permission for man to hunt, it is interesting that the Bible refers to Nimrod, Noah's great-grandson through the line of Ham (Gen. 10:6–8), as "a mighty hunter before the LORD" (Gen. 10:9), as it may be possible that he used tame canids or even fully domesticated dogs in his hunting. He is described as being "the first on Earth to be a mighty man" (Gen. 10:8)⁷² and is revealed as the instigator of the building of the Tower of Babel in the land of Shinar (Gen. 10:10).⁷³ Scripture does not tell when Nimrod led the building of Babel, nor even how long he lived. However, the timing of the Babel event seems to be indicated in Genesis 10:25, where one of Eber's two sons is named "Peleg, for in his days the earth was divided". Contrary to the modern interpretation of this verse as referencing continental drift,⁷⁴ the context appears to reference the linguistic division and population dispersion at Babel:

"In context, only eight verses after 10:25, the Bible states, 'Now the whole earth (*erets*) had one language and one speech' (Genesis 11:1), and as a result of their disobedience, 'the LORD confused the language of all the earth (*erets*)' (Genesis 11:9). This conclusively proves that the 'earth' (*erets*) that was divided was the *same earth that spoke only one language*, i.e. 'earth' (*erets*) refers in this context to the people of the earth, not Planet Earth. [There is] one meaning of *erets* as people of the land, and the context means this is what Genesis 10:25 must refer to.'"⁷⁵

There are two ways to interpret the meaning behind Peleg's name. On the one hand, this may be a reference to him being born the same year as the dispersion at Babel occurred. Since Peleg was born about 101 years after the Flood (Gen. 11:10–16), this would place the Babel event at c. 2,420 BC. On the other hand, the name given to Peleg may have been prophetic, predicting the coming Babel event.⁷⁶ If this is the case, then the dispersion could have taken place any time during his lifetime (Gen. 11:18–19), yielding a date range for the Babel event of c. 2,420–2,181 BC. However, Job lived in the land of Uz c. 2,200 BC, narrowing this date range for Babel to c. 2,420–2,200 BC.⁷⁷

Given that Job had time to accumulate much material wealth (Job 1:3), have 10 children (Job 1:2), and become established as some sort of high local official (Job 29:25, cf. vv. 21–24), it is likely that the Babel event occurred either before or early in his lifetime, but since Job's lineage and date of birth are unknown, a more precise date range for Babel cannot be provided from the biblical data alone.⁷⁸

Possible models for domestication

Based on the date ranges available, there are three possible models for the timing and geographical location of initial post-Flood domestication of wolves into dogs either pre- or post-Babel (see table 1 for summary).

If initial domestication occurred prior to the dispersion at Babel, then it would have occurred in a single general geographical region somewhere in the Middle East, particularly the area between 'the mountains of Ararat' (where the Ark landed; see Gen. 8:4) and the site of the Tower of Babel. This would fit well with scientific data indicating initial domestication occurred in the Middle East. Then, following the dispersion from Babel, domestic dogs would have migrated with their respective human masters to new geographical locations,⁷⁹ such as Europe and East Asia. It is also possible that the early domestication seen in Europe and East Asia (and perhaps other locales) were independent events occurring in post-Babel human colonies. Either scenario would account for early domestication of canids in those areas and others where post-Babel populations settled.

If initial post-Flood domestication took place pre-Babel, then it would have occurred either c. 2,521–2,420 BC or

Table 1. Possible models for the timing and geographical region(s) of initial post-Flood domestication of wolves into dogs

Scenario	Minimum Date	Maximum Date	Geographical Regions
Pre-Babel (earliest date)	c. 2,521 BC	c. 2,420 BC	Initially in the Middle East
Pre-Babel (later date)	c. 2,521 BC	c. 2,200 BC	Initially in the Middle East
Post-Babel	c. 2,420 BC	c. 2,200 BC	Probably numerous, independent, multi-regional events

c. 2,521–2,200 BC. As previously mentioned, current research experiments into canid domestication indicate that the former date range of about a century could be more than enough time to produce domestic dogs from wolves under normal conditions, possibly taking place within only a few dog generations.⁸⁰ The combination of selective pressures from the post-Flood environment and human breeders, however, may have incited domestication to occur at much faster rates than it normally would today.

Alternatively, if initial post-Flood domestication took place post-Babel, then it could have occurred through several independent major domestication events across multiple geographical locations. As previously mentioned, there are high biogeographical concentrations indicating early domestication in Europe, East Asia, and the Middle East, which would have been major areas of post-Babel human migration.⁸¹ If initial post-Flood domestication took place post-Babel, then it would have occurred c. 2,420–2,200 BC.

Weighing the models

The scientific data discussed concerning the biogeographical distribution of early canids can be interpreted to fit well within any one of the three possible creationist models for the initial post-Flood domestication of wolves into dogs. A pre-Babel domestication model seems the most likely due to man's pressing need to hunt for food in order to survive the harsh post-Flood environment (cf. Gen. 9:2–3, 10:9). As previously mentioned, similar to the standard story in the mainstream scientific literature, we might imagine less-fearful wolves—descendants of the pair of wolf-like representatives of the canid kind that was on the Ark—scavenging for food from the post-Flood human population. Over time, these canids became tamer and some were eventually selected, likely as pups, by humans for domestication for utility in hunting, protection, and even shepherding.⁸² From the perspective of these animals, this would be a good reciprocal trade-off: while they would assist their human masters in hunting for food and protecting the resources, they would in turn get to share in the rewards of the hunt and have a relatively safe, comfortable home in the midst of the harsh post-Flood environment. This is, of course, only hypothetical and, though reasonable, ought to be treated as speculation.

Concluding remarks

The hope for this paper is to incite more research into developing a creationist model for the origins of domestic dogs as well as models for the origins of other species. Further research ought to be done in post-Flood canid migration patterns in order to shed more light on the timing and geographical locale(s) of initial domestication. New insights into the timing of Babel and the events of Job may also allow us to draw more precise and even narrower date ranges for domestication. However, the preliminary biblical and scientific insights discussed in this paper should provide a good starting point for better understanding the paleontological data and for further developing a creationist speciation model for the canid kind.

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63. The land of Uz was possibly originally settled by Uz, the grandson of Shem (Gen. 10:22–23).
64. For those who place the life of Job at a later date, consider what follows to be an exploration of the narrowest possible date ranges for initial post-Flood dog domestication.
65. Most scholars who accept the historicity of Job believe Job lived for about 200 years. The Septuagint indicates that Job died at the age of 240, an age comparable to the age at death of Serug, Abraham’s great-grandfather, who died at the age of 230 (Gen. 11:22–23). This would fall in line with creationist models of the decrease in human life spans after the Flood.
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71. This is not to say, however, that sinful man may not have domesticated wolves for such purposes prior to the Flood.
72. Since there were ‘mighty men’ before the Flood (Gen. 6:4), this reference must mean that Nimrod was the first mighty man *after* the Flood.
73. The confusion at Babel may explain why Nimrod left his kingdom in Shinar to settle in Assyria (Gen. 10:10–11).
74. A discussion of the difficulties with this interpretation is outside the scope of this paper. However, see: creation.com/arguments-we-think-creationists-should-not-use#peleg.
75. Sarfati, ref. 49, pp. 651–652; emphasis in original.
76. Consider Methuselah (Gen. 5:25–27) who died the year of the Flood, whose name can mean “when he dies, it shall be sent”.
77. This, of course, assumes that all post-Flood people at the time were present at the Babel event. While some commentators think otherwise, the text surely implies this, especially by the fact that the rebellion at Babel was fuelled by the desire to disobey God’s command for post-Flood people to disperse and fill the whole earth (Gen. 11:4, cf. 9:1). If other post-Flood populations had already spread to other regions, and if Job, his family, friends and others had settled in the land of Uz prior to the Babel event, then why would it be wrong for one particular group to settle at Babel, upon whom God placed judgment by causing linguistic division and dispersing the people across the face of the earth (Gen. 11:7–9)? Furthermore, Genesis 11:9 says he confused the language of “all the earth”, which in the context of this passage means *all the people of the earth*. It was a universal judgment on “one people” with “one language” (Gen. 11:6). See Sarfati, ref. 49, pp. 651–652.
78. This is not to say that more precise date ranges for the Babel event could not be provided by way of archaeological or other historical data. Perhaps this will be the subject of a future paper. In the current context, however, the concern is what possible dates may be gleaned from the biblical record in particular.
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81. See Schroeder, L.L., A Possible post-Flood migration route, *J. Creation* 19(1):65–72, 2005.
82. While it is possible that some early post-Flood humans began to domesticate dogs simply for companionship purposes (i.e. as pets), the author is hesitant to assert this as probable given the generally low view of dogs in the ancient world. Even the Bible indicates a low view of dogs, associating them with evil (Phil. 3:2; Rev. 22:15) and low status (Ex. 22:31; Deut. 23:18; 1 Sam. 24:14; 2 Sam. 3:8, 9:8; 2 Kings 8:13; Prov. 26:11; Eccl. 9:4). There is even possible indication that physical violence towards dogs was considered acceptable (1 Sam. 17:43; Prov. 26:17). This may be at least in part due to wild scavenger dog-like canids eating dead human bodies (see 1 Kings 14:11, 16:4, 21:19, 23–24, 22:38; 2 Kings 9:10, 36). In light of these passages, it could well be that the low view of dogs was due to the natural mangy appearance and aggressive, carnivorous behaviour of the early post-Flood canines (as with wild wolves today). The idea of simple companionship possibly only occurred to the dogs’ masters *after* they had already been domesticated for practical purposes and developed a more amiable appearance and more docile behaviour. That being said, it may well be that some early post-Flood people identified ‘cuteness’ in wild canids (likely the pups) and sought to take them in as pets, though the dogs were later tragically neglected by their supposed caretakers and left to fend for themselves, leading to reversion to the wild appearance and behaviour of their ancestors, which in turn gave rise to the low view of the canids found in Scripture and elsewhere in the ancient world. Either possibly could explain the current data, but this author favours the first.

Cody J. Guitard has a B.Sc. in biology from Crandall University and an M.A. in apologetics (concentration in scientific apologetics) from Southern Evangelical Seminary. He is a full-time apologist with Ratio Christi and is the Chapter Director for RC at Crandall University as well as the Regional Director for RC Canada. His research interests include apologetics, theology, philosophy, and science.

The theory of true narrative representations and some of its applications

John W. Oller Jr, Latayne C. Scott, and Brenden D. Oller

'True narrative representations' (TNRs) are essential to successful communications. Every TNR has some particular complex object (O), a symbol string (S), and a moving index (π) connecting S to O . The parts may be relatively simple, or incredibly complex, but they always agree. The agreement of every TNR expresses the triune nature of the Creator God who solved infinitely many instances of Chaitin's Ω -limit of irreducible complexity. Proved by Peirce's mathematical logic, TNR-theory generates many testable hypotheses. It demolishes the 'junk' theory of DNA and obliterates barriers between disciplines. Strawn, Collins, Omdahl, and others have applied TNR-theory in theology, archaeology, and genetics. Briggs, Scott, and Collins have used it to find biblical Ai and Sodom. Leslie has shown that the Genesis Flood account is a TNR. Gryder and others have used it to explain cancers as Shaw has done for Alzheimer's, Parkinson's, and biological disorders in general. It is remarkable that in ordinary experience, as in the sciences, no material facts can be discovered without TNRs to represent them. Because the Bible reports events from creation to eternity, if it is a TNR as we believe, TNR-theory shows with mathematical certainty that valid human understanding must agree with the Bible.

Both Albert Einstein and psychologist Jean Piaget noted that strings of words can be arranged somewhat independently of the facts they purport to represent.^{1,2} This means that we can use words to express imaginations and accidental errors along with deliberate lies and nonsense. But, as Einstein and Piaget also agreed, every language user depends on consistent representations of actual entities, events, and relations in experience to learn one or more languages. Einstein went on to argue that validity in abstract scientific theories depends on their agreement with impressions from perceptual experience. In saying this, Einstein anticipated the process by which *true narrative representations* (TNRs) are constructed. He also agreed, whether intentionally or not, with the 'exact' strict mathematical 'logic' on which Charles S. Peirce grounded the 'correspondence theory of truth'.³

The biblical narrative asserts that truth telling requires agreement between words and the events to which they refer. Moses expressed the principle indirectly in this way:

"When a prophet speaketh in the name of the LORD, if the thing follow not, nor come to pass, that is the thing which the LORD hath not spoken, *but* the prophet hath spoken it presumptuously: thou shalt not be afraid of him" (Deuteronomy 18:22, KJV).⁴

Ordinary 'truth', in the least burdened sense, depends only on the agreement of a string of words with whatever facts of experience it purports to represent. If the words and the facts agree, Peirce insisted that such agreement is all the truth that the words in question can possibly deliver.⁵ Building upon the biblical principle of consistency—an idea expressed fully only in the God of Abraham, Isaac, and Jacob, the God who is the same yesterday, today, and forever (Hebrews 13:8), who cannot be made to lie (Titus 1:2), even if all men are liars

(Romans 3:4)—the theory of true narrative representations (TNR-theory) has been established.⁶⁻⁹

TNR-theory

By examination of ordinary human discourse, we find that TNRs are not only essential to language acquisition and to all successful communications, but are by far the most common type found in ordinary experience.^{10,11} In every TNR, as suggested in figure 1, strings of signs (S) consisting of words are linked through articulated actions (π) with our knowledge of sensory impressions about the objects (O) in the world of our experience. If the three elements agree as perfectly as they purport to agree with the relevant facts they signify about the world, then, the whole triad consisting of that $S\pi O$ relation is a TNR. For example, if Moses was raised in Pharaoh's household, then saying so is a TNR. The facts of history deliver all that is claimed in saying that Moses was raised in Pharaoh's household. Moreover, TNR-theory proves that facts about the world of experience can only be known or discovered through TNRs. Many empirical consequences flow from the unique logical properties of TNRs. For instance, if it is true that Jericho was visible from the east side of the Jordan River where Sodom was located, then, a search for the site of Sodom should be conducted from a location that is east of the Jordan River Valley opposite the ancient ruins of Jericho. Some of the most surprising consequences of TNR-theory were anticipated in Einstein's claim that there is a logically uncrossable gulf (see the lower-middle part of figure 1) between the material world known to us through sensory impressions and the realm of abstract

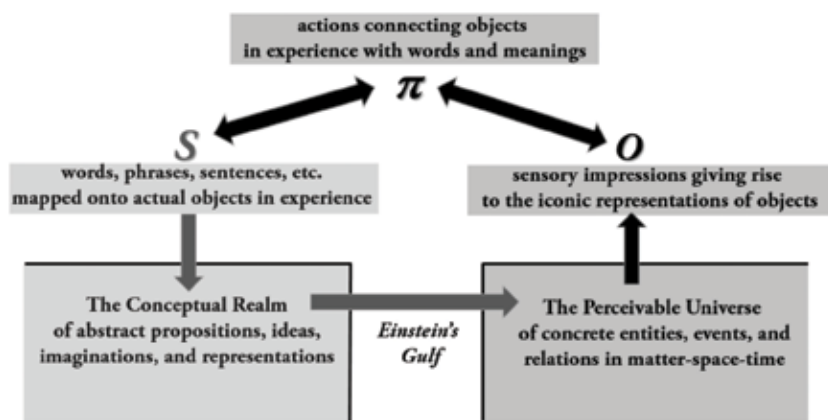


Figure 1. Crossing Einstein's Gulf through abstract TNRs enriches our experience of the concrete material world.

ideas that we can only discover and express through words and combinations of them.^{12,13} For instance, it follows by strict logic that there is no inherent reason why any string of abstract symbols must resemble the 'facts' it represents. Abstract strings of symbols are almost always entirely unlike their material objects.

In TNRs, nevertheless, human beings successfully cross Einstein's Gulf. We do it in comprehending, learning, and using our language(s). Whenever we construct TNRs, we map strings of words into our experience to make them actually fit (agree with) the facts about our experience that our words signify.

In the proofs of TNR-theory, we first take account of the three-part system of relations found in every TNR as suggested in the diagram of figure 1. In every TNR, irrespective of its complexity, the S , π , and O must be in agreement. The O must deliver all that the S signifies, and the π -mapping must connect the S and the O so that their agreement is discoverable to users of the language in question. At the highest level of abstraction, we find the symbol (or complex string of symbols), S . This part of the dynamic system may be relatively simple, such as a name used to refer to the entity, person, or place to which that name conventionally applies. Or, S may be complex, such as the whole Bible, or the historical events of World War II. The somewhat less abstract middle element of the three-part system of every TNR is necessarily a sequence of articulated acts, π . That pragmatic part must involve the movements of speech, writing, typing, or in some way producing a letter, an email, a book, or a discourse that, again, may also be simple, such as an act of pointing, or complex, as in the construction of the Bible by many different authors over many centuries who worked in isolation from each other. The middle part of the TNR, the π mapping, must succeed in connecting the S of that TNR with the third part which is its particular material object, call it O , that is singled out for attention. That O may be one or many entities, relations, or events in

the material world. However, in the instance of a TNR, the particular O in question (whether simple or complex) is just the O that S signifies.

The necessity of TNRs

Only from the perspective of TNRs, can we understand human experience, or anything in the sciences. Even if a majority of scientists should deny this, ordinary truth—the agreement between words and facts—once established cannot be changed by any kind of voting or ever so many focus groups.

TNRs are what they are, independently of what we may think or say. Also, TNR-theory itself is grounded in nothing but the simplest notion of consistency. However, as far as we know, no perfect consistency has ever been found in all the sciences, mathematics included. Moreover, if Gregory Chaitin is correct, no such consistency ever will be found.¹⁴ According to the Judeo-Christian Scriptures, only the God of the Bible is perfectly consistent, throughout all time and for eternity.¹⁵ Chaitin's series of intuitive proofs purport to show why it is impossible for absolute consistency to be found in the material world. He writes about an omega (Ω) limit of 'irreducible complexity'. His argument is mathematically simple yet conceptually abstract. It shows that solving the full complexity of the arrangements of the dust that constitute biological organisms is out of reach of mathematical reasoning to an infinite degree. Chaitin's Ω -limit might be thought of as a tree of infinite branches; each exploding into another similar tree with an infinitude of infinitudes of branches involving 'irreducible complexity'. Or imagine an unsolvable maze that branches into an infinity of infinitely many branching mazes of infinitely increasing complexities. Oller wrote to Chaitin pointing out that the 'surpassing complexity' which Chaitin described in his proof "is not quite out of reach of our intuitive imaginations". Otherwise, without our amazing language capacity, Chaitin would not have been able to develop, much less explain to others, his intuitive proof.

That same capacity enables us to understand that God's thoughts are intrinsically undiscoverable by hide-bound minds limited by the space-time universe, unless he chooses to reveal them to us. Nevertheless, to understand fully abstract ideas we obviously depend on the infinity that God put in our hearts per Solomon's dictum in Ecclesiastes:

"He has also set eternity in the human heart; yet no one can fathom what God has done from beginning to end" (Ecclesiastes 3:11, NIV).

Or, as the Apostle Paul put it in one of the most quoted chapters of the New Testament,

“For now we see through a glass, darkly; but then face to face: now I know in part; but then shall I know even as also I am known. (1 Corinthians 13:12, KJV).

In any case, with Chaitin’s Ω -limit of irreducible complexity in hand, we can use it as a complete and irrefutable disproof of Carl Sagan’s patently false, even derisible, argument that the existence of the universe and our being here in it proves evolution.¹⁶ The fact is that evolutionary theories fail to ask the most obvious questions about life. What are we and how did we get into these bodies where we find ourselves? The theory of evolution, no matter how it might be shaped, tells nothing about the self (soul). What happens to the self after death? In one verse of the gospel of Matthew, Jesus told us more concerning those deeper questions than all the books and articles ever written about evolution:

“For what is a man profited, if he shall gain the whole world, and lose his own soul? Or what shall a man give in exchange for his soul?” (Matthew 16:26, KJV).

Perhaps quite unintentionally, Chaitin’s proof shows the inescapable need for the God to whom nothing is impossible. Our existence shows that the Creator God can and has obviously solved the Ω -limit of irreducible complexity. My existence and yours are proof that Chaitin’s limit cannot be imposed on God, yet stands as an absolutely insurmountable

barrier to evolution and all those who believe in it. God laughs at all such barriers and at men who think he cannot overcome them (Psalm 2:4, 37:13).

The proofs of TNR-theory have been developed in several different ways^{6,7,17} but were summed up most simply in an article in *Entropy*, published by Elsevier in 2014.¹⁷ If a person distinguishes any given object from all the others that could be pointed out with words, it follows that the $(S\pi O)$, produced and understood determines enough information to set that O —say a particular set of car keys, or a car, or a parking place, or an address, or an accident, or a war, or anything at all—apart from all other objects in the entire universe. Every TNR can do this with its particular O regardless if the O is simple or complex. But suppose you were asked merely to imagine a set of car keys that may or may not exist. You would be obliged to construct something like a TNR, but with the material object, O , defined only by the significance of the S . However, the O must be imagined on the basis of whatever significance you infer from S . The fictional (imagined) O in such a dynamic representation could be represented as $(S\pi _)$, where the missing O must be supplied in part or in whole by the interpreter of the fiction strictly on the basis of a subjective interpretation of the fiction. In such a case, there is no way to check the interpretation of O against any particular fact because the fictional representation



Figure 2. The ribbon cutting day for the Ark Encounter on July 5, 2016, with a full-scale model of Noah’s Ark attended by Mary Anne and John Oller with biochemist Dr Lucija Tomljenovic, shown from left to right in the highlighted portion of the photograph in the lower-right corner.

is not determinately connected to any particular material *O*. The *O* is merely imagined, and may or may not exist anywhere in the material universe (other than the mind of the imaginer). Obviously, every such fiction is less determined than any TNR. Therefore, fictions are also less connected to the material world than TNRs, and for that reason are less generalizable to other contexts because there is no way to discover the resemblances or lack of them between any imaginary *O* and the real things that the *S* in question might be used to refer to in a TNR. Therefore, TNRs are more *determinate*, *connected*, and *generalizable* than any fictions that might be derived from them by requiring interpreters to imagine their respective objects. As the proofs of TNR-theory show, errors, lies, nonsense, and signs that are completely erased (non-existent) are necessarily less well *determined*, *connected*, or *generalizable* than fictions. Therefore, the proofs are complete.

Leslie and other applications of TNR-theory

TNR-theory has figured indirectly in many contexts.^{18–22} It was the background focal point of a recent lawsuit defending the right of an American professor to believe in the Creator God of the Bible which Oller pursued all the way to the U.S. Supreme Court.²³ That suit was one among those referred to in the credits of the 2014 film *God Is Not Dead*.²⁴ In fact, TNR-theory depends entirely on the biblical narrative of creation and may perhaps be judged in the future to have made a small contribution to the fulfilment of the prophecy of Daniel concerning the increase of knowledge in the last days.²⁵ The Bible makes it clear that the power of language is foundational not only to the creation, but to those creatures made in the image of God. Oller and Omdahl argued that the defining element of that image is the language capacity¹⁸—a capacity which even Chomsky of MIT fame says is owed to ‘special design’ (p. 27).²⁶

In this *Journal of Creation* article, the original plan was to write about the application of TNR-theory to the biblical, geological, and historical evidences of Noah’s Flood. The impetus was the bold and unprecedented Ph.D. dissertation at Trinity Southwest University written by John G. Leslie²⁷ concerning the record of Noah’s Ark. It is interesting that Dr Leslie’s book should appear so soon after the opening of the Ark Encounter in northern Kentucky (see figure 2).

In view of Leslie’s book and other publications from Trinity Southwest University in Albuquerque, New Mexico, we can say that Trinity has been the crucible of important theological works based on TNR-theory introduced there in the mid-1990s. Subsequently, those ideas found extensive application by J. Michael Strawn (developer of Representational Research in theology) and by Latayne C. Scott (the second author of this paper), and others. At Trinity, Leslie’s work was preceded by the seminal dissertation of

Trinity’s Peter Briggs, who used TNR-theory to pin down the biblical site of Ai as described in the book of Joshua.²⁸ Briggs noted that as few as three distinct points of geological reference are commonly sufficient to determine a particular, unique location as he did for Ai based on the biblical record and geographical descriptions found there.

Scott’s dissertation, *A Definitional Study of Biblical Representational Research and its Current Applications* (2003), also relied on inferences from TNR-theory.²⁹ Later, Trinity’s founder, Steven Collins used TNR-theory in a solidly concrete way. Collins asserted (in the book with Scott) that while ancient mythologies claim to be history, they often contain fictional characters and events, but never mythical geographies.³⁰ Artefacts alone are meaningless, but with a TNR to guide the archaeologist as Briggs demonstrated, and as Collins and Scott have shown with reference to the site of Sodom in their book, *Discovering the City of Sodom*,³⁰ it only takes a few geographical reference points to zero in on a particular location anywhere on the face of the earth.

Leslie, a practising physician, had already earned an MD before writing his detailed Ph.D. dissertation on the biblical account of Noah’s Flood. He showed that the biblical record of Noah’s Flood has all the marks of a TNR.²⁷ That being the case, the Genesis account must be read as historical and a TNR. Moreover, geological evidences of that Flood are—as Henry Morris, John Whitcomb, Ken Ham, and others have been arguing for some years—written in stones and sedimentary deposits all over the earth.

Leslie, however, took on the difficult and abstract problem of demonstrating that the biblical narrative concerning the world-wide Flood of Noah’s time meets all the requirements of *determinacy*, *connectedness*, and *generalizability*. He reasoned outward from those unique logical identifiers of every TNR, reviewing the evidences from unique linguistic forms in the narrative, including the peculiar Hebrew word translated as ‘Ark’, to the many ancient Flood stories (‘myths’), including the tale of ‘Gilgamesh’, right down to the geological evidences written in the rocks.

The narrative of Noah’s Flood and the souls that were saved on the Ark, is a *TNR within the larger Messianic narrative of the whole Bible*. Human history demonstrates that one after another biblical prophecies have been fulfilled on an apocalyptic scale, with a height, and depth, and breadth that absolutely defies chance just as Gregory Chaitin seems inadvertently to have proved mathematically.¹⁴

Most recently in 2017, Scott used TNR-theory to refute the truth claims of Mormonism.³¹ Her work shows how TNR-theory can be used to demolish the false doctrines of cults and ‘-isms’ in general.

Finally, no discussion of applications of TNR-theory would be complete without noting its centrality to much ongoing research in the biological sciences. The health and well-being of our bodies, for instance, depend on many

billions of correct mappings—ones that must be based on well-formed TNRs—from DNA to RNAs to proteins and back again as Pellionisz has demonstrated.³² The upshot of the work with biosignalling systems is that the corruption of valid messages in genetic, epigenetic, and proteomic systems inevitably leads to such disorders as cancers,^{33–35} neuropathologies such as Parkinson’s and Alzheimer’s^{32,33,36} and to all the disorders that inevitably trend toward the catastrophic biological disaster that we euphemistically term ‘mortality’.^{9,37,38} Because health and well-being depend on valid interpretations of biosignalling messages, it follows that flawed systems of communication that retain any life-sustaining functionality must contain or be contained within TNRs in order to work at all. TNR-theory shows why it is certain that injuries to biosignalling systems from toxicants, radiation, pathogens, physical trauma, and combinations of these, invariably trend toward disorder, disease, and eventually death.^{9,17} When the degeneracy of such systems reaches a critical level, a general and complete catastrophic breakdown must follow.

Additional implications of TNR-theory

Notably, it is on the basis of our words that we have been told we will be called into judgment, or that we may escape from judgment by trusting in the blood of Jesus. Jesus said that all human beings will give an account on the Day of Judgment for every careless word we have spoken.³⁹ If our words agree with what God has revealed, then, they are words of salvation, redemption, grace, and peace with God. If our words do not conform to what God has said and done in the work of Christ—first in creating everything that is, then in redeeming us on the cross, rising from the dead, and soon returning in great power—there is no hope for us.

Significantly, Jesus validated the TNR nature of the Old Testament writings in surprising ways—by referring to events such as the creation account of Adam and Eve, manna (John 16:31), the turning of Lot’s wife to salt (Luke 17:32), the great fish of Jonah (Matthew 12:39–41)—as well as the Flood of Noah and the destruction of Sodom and Gomorrah. This is remarkable because these are events, along with the Virgin Birth, the Resurrection, and the recorded miracles, that are not reproducible by scientific experiments.

The most startling implication of TNR-theory is that *facts of experience are absolutely dependent on TNRs in order for those facts (any facts whatsoever) to exist or be discovered in the first place.* What is more, flawed and changing material ‘facts’ can only be known through TNRs that are relatively eternal in character and in this respect quite unlike the ephemeral ‘facts’ themselves (as proved some years ago).⁴⁰ The fundamental error of supposing that science depends on self-evident material ‘facts’ is revealed as soon as it becomes clear that the only access any scientist ever has

to any ‘facts’ whatsoever, must be through consistent TNRs that enable the discovery of those same ‘facts’. Also, if the Bible is a TNR, it follows from TNR-theory by exact logic, that events of the past, including those uncovered by biblical archaeology, depend on what the Bible says. The Bible teaches that “in the beginning was the Word” (John 1:1), not the material universe. The existence of material entities, events, and relations depends, therefore, on precisely the sorts of messages that are revealed to us in the Scriptures. But God depends on nothing but Himself. If God says it, that’s the way it was, is, and will be. By the same token, no revealed TNR of the Bible is testable in the slightest degree by archaeology, or any conceivable empirical investigation. The fact is that no scientific study of any kind can be undertaken in the absence of TNRs to direct the empirical study in the first place.⁴¹

According to the testimony of the Alpha and Omega, “the Beginning and the End” (Revelation 1:8, 11, and 17), the Creator God, has always been, continues now, and will never cease revealing himself in the events of the material universe as observed by human beings from the time of Adam forward and throughout eternity. All this and infinitely more is recorded in the historical and prophetic biblical narrative. Some of it we already understand, but much remains to unfold.

Nevertheless, if the God who cannot be made to lie—the ultimate and utterly reliable generator of all TNRs—is telling the story, and if the parts we can understand are obviously true of ourselves and of all aspects of our known predicament in space and time, why would we not trust the Lord about the parts that pertain to the eternal perspective which we cannot yet fully grasp? Jesus put it this way to Nicodemus:

“I have spoken to you of earthly things and you do not believe; how then will you believe if I speak of heavenly things?” (John 3:13, NIV).

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John W. Oller Jr. teaches anatomy and physiology along with language acquisition. Two years after completing his doctorate, he was advanced to tenure and the associate level at the University of California, Los Angeles. He founded the Department of Linguistics at the University of New Mexico and earned a the Ph.D. in language sciences at the University of Louisiana. He received the Mildenerger Medal in 1983 and was one of 100 Stars for 100 years at the Fresno City College Centennial in 2010. He is a Christian apologist and creationist.

Latayne C. Scott is the recipient of Pepperdine University's Distinguished Christian Service Award for her writing. She has published hundreds of magazine articles and other short works, and has over two dozen books published by HarperCollins, Simon & Schuster, and other publishers. She has an undergraduate degree from the University of New Mexico, a master's degree from Trinity Seminary and College of the Bible, and her doctorate is from Trinity Southwest University. She is a full-time writer who lives in New Mexico.

Brenden D. Oller is a published poet, a creative writer of short stories, and an illustrator of his own works and those of others. He specializes in technical editing and in tutoring aspiring writers. Brenden enjoys competitive tennis, internet chess, and evaluating high tech games. He is an avid student and defender of Christianity and biblical creation.

Bestselling British journalist, a gay atheist, confirms the toxicity of Darwinism to the Christian faith

The Strange Death of Europe: Immigration, identity, Islam

Douglas Murray

Bloomsbury Continuum, London, 2017

John Woodmorappe

Author Douglas Murray is associate editor of the *Spectator*. He also writes in the *Sunday Times* and *Wall Street Journal*.

This is not a work on origins. It is largely about the mass migrations of Third-World immigrants to Europe in recent decades. However, author Murray also discusses the decline of Christianity and Christian values in Western Europe (and, of course, in other occidental nations). In doing so, his position, coming from an unbeliever, strongly converges with the ‘fundamentalist Christian’ assessments of the fatal effects of higher criticism and Darwinism.

A synopsis of this explosive book

This book is full of interesting information. The author refutes the argument that mass Third-World immigration to Europe is necessary because white Europeans do not want to have children at even population-replacement levels. He shows that most white Europeans cannot afford to have even one child, let alone several, but would definitely like to have children. Murray also shows the

hollowness of arguments involving diversity, compassion for refugees, etc. The author especially takes umbrage with the long-term trend of instilling white guilt that comes by the constant portrayal of Europeans, and their descendants in other First-World nations, as racists, colonialists, and thieves of the lands of native peoples. However, Murray does not go as far as attributing these trends to deliberate agendas of cultural Marxists and globalists. Rather, he seems to see them as uncaused cultural trends.

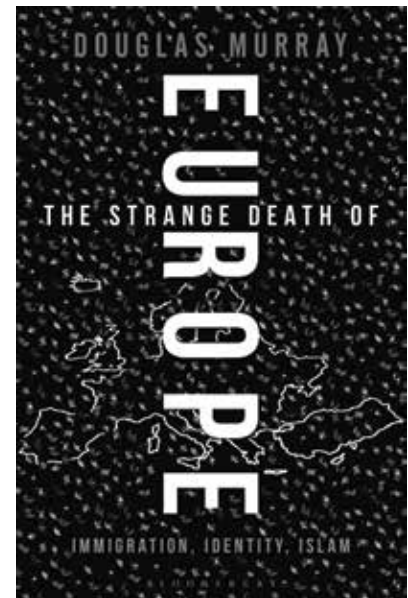
Europe: once a citadel of Christianity

Douglas Murray writes:

“For centuries in Europe one of the great—if not the greatest—sources of such energy came from the spirit of the continent’s religion. It drove people to war and stirred them to defence. It also drove Europe to the greatest heights of human creativity. It drove Europeans to build St. Peter’s in Rome, the Cathedral at Chartres, the Duomo of Florence and the Basilica of St. Mark in Venice. It inspired the works of Bach, Beethoven and Messiaen, Gruenwald’s altarpiece at Isenheim and Leonardo’s *Madonna of the Rocks*” (pp. 209–210).

The destruction of the biblical foundation of Christianity

Many creationists (for example, Ken Ham) have spoken about the fall of the building (Christianity) that takes



place once its foundations (Genesis 1) are destroyed (Psalm 11:3). Without relying on the Bible, atheist Murray adheres to a very similar template of thinking. He freely realizes that the loss of biblical authority on the subject of factual matters undermines its authority on all other matters. He sagely comments:

“Yet in the nineteenth century that source received two seismic blows from which it never recovered, leaving a gap that has never been filled. The effects of the wave of biblical criticism that swept through German universities in the early nineteenth century is still being felt two centuries later ... Europe had knowledge of the great myths, yet the Christian story was the continent’s foundational myth and as such had been inviolable ... It was joined in 1859 by the other part of the double-whammy to the Christian faith, Charles Darwin’s *On the Origin of Species by Means of Natural Selection*” (pp. 210–211).

Implications of modernism: The Bible relegated to a storybook

Even so, liberal theologians and compromising evangelicals have

always assured us that it does not matter, to religious belief and practice, whether or not the Bible is factually accurate. Murray parts ways with this disingenuous narrative. He first recounts the long-term impact of the adoption of biblical errancy that was part of the higher-critical worldview:

“Pulled apart by historical comparison, questions of authorship and questions of fallibility, the generation of believers after [David Friedrich] Strauss would have to find a new accommodation with these discoveries. Some pretended that these changes had not occurred, were not relevant, or had all been answered before. But much of the clergy began to realize that a fundamental shift had occurred and that they must shift too” (p. 211).

Murray leaves nothing to the imagination as he informs the reader where modernism has led us: “It was still possible to find wisdom and meaning in the Scriptures, but the Bible had at best become like the work of Ovid and Homer: containing great truth, but not itself true” (p. 211). Indeed! Clearly, the much-maligned Fundamentalists of the early 20th century were on to something.

Evolution is inherently atheistic, period

The issues go far beyond biblical authority. They strike at the very existence of God. Murray quips:

“Where once divine design had explained all that was awe-inspiring, Darwin [figure 1] put forward an entirely new proposal: that, as Richard Dawkins has summed up, ‘Given sufficient time, the non-random survival of hereditary entities (which occasionally miscopy) will generate complexity, diversity, beauty, and an illusion of design so persuasive that it is almost impossible to distinguish from deliberate intelligent design.’ Darwin’s discovery was fiercely

debated at the time, as it is now. But the backlash was doomed to failure. The condition of the argument for the divine scheme after Darwin was not good. This was not about a single discovery—it wasn’t even about the filling in of one particularly large gap in man’s knowledge. It was simply the first wholesale explanation for the world we inhabit that had no need for God. And though the origin of life remained a mystery, the idea that the entire mystery was solved by the claims of religion seemed less and less plausible” (p. 211).

The ongoing legacy of higher criticism and Darwinism

The author twists the knife into those who ridicule conservative Christians for engaging in ‘the battles of yesteryear’. Precisely the opposite is the case, as he makes crystal clear: “Although almost everybody in Europe now knows some version of these facts, we have still not found a way to live with them” (p. 211).

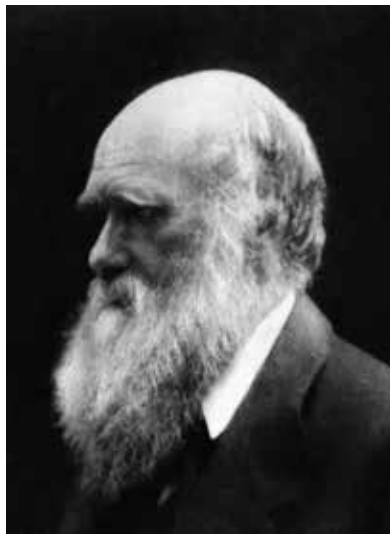


Figure 1. Charles Darwin's ideas did far more than introduce a ‘new’ theory of origins. They rewrote history and undermined the very existence of God.

Murray then specifies the reason he thinks European Christianity went into a death spiral:

“The facts of the loss of belief and faith across a continent are frequently commented upon and indeed taken for granted. But the effects of this are less often considered. Rarely if ever is it recognized that the process described above meant one thing above all: Europe had lost its foundational story. And the loss of religion to Europe did not just leave a hole in the moral or ethical outlooks of a continent, it even left a hole in its geography” (p. 212).

That is, the centre of each village in Europe had been a church.

What’s more, what little is left of Christianity in Europe lacks conviction and authority: “Where faith exists it is either wholly uninformed—as in the evangelical communities—or it is wounded and weak. In very few places does it retain the confidence it had in former times, and none of the trends favour these outposts” (p. 212). In addition: “Even someone who regrets their inability to connect with the faith that used to propel them cannot believe again simply in order to regain the propulsion” (p. 213). This can be generalized: “We sometimes behave as though we had the certainties of our ancestors, yet we have none of them, and none of their consolations” (p. 223).

Radical individualism, nihilism, and selfish hedonism have replaced Europe's Christian heritage

The Bible warns of the love of pleasure exceeding the love of God—a sure sign of terminal apostasy (2 Timothy 3:4). Pleasure is now the end-all, as there is nothing left to hope for (Isaiah 22:13). Enter the extreme secularization of Western Europe. It has largely reduced the population to pleasure-seeking, and this wantonness

shows up more and more in academia and media. Murray offers this parting shot:

“We have not become ‘absolute’ cynics, but we have become deeply ‘suspicious’ of all truths. The fact that all of our utopias failed so terribly did not only destroy our faith in them. It destroyed our faith in any and all ideologies. It does seem, living in any Western European society today, that this particular world-view has caught on. Not only the entertainment industries but also the information industries speak to populations intent only on a fairly shallow kind of personal pleasure” (p. 222).

Conclusions

It is counter-intuitive that a homosexual and atheist would agree with conservative Christians on issues related to origins. Yet bestselling author Douglas Murray, to a surprising extent, does. Of course, other atheists have been candid about the fact that God and evolution are incompatible, but they have usually done so from a condescending, triumphalist mindset. Murray does not. In fact, if anything, he seems to have an element of sympathetic regret about the death of Christianity owing to the axe of higher criticism and then Darwinism.

Issues surrounding the inerrancy of the Bible, and the fallacies of evolution, are far from being hopelessly old-fashioned. They are as relevant as ever. So where do we go from here? If Europe, and other European-descendent nations, are ever to experience a genuine (and not simply faddish or fleeting) spiritual revival, it will have to be founded on a rediscovery and unambiguous articulation of the absolute truth of Scripture.

Unmasking natural selection

40 Years of Evolution: Darwin's finches on Daphne Major Island

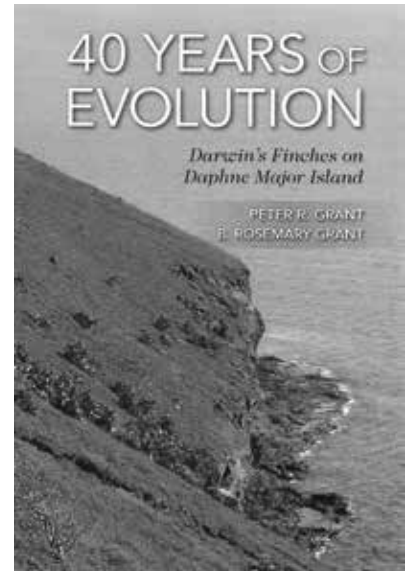
Peter and Rosemary Grant

Princeton University Press, Princeton, NJ, 2014

Jean K. Lightner

To many people, the word evolution is equated to humans descending from ape-like creatures, or all life originating from simpler life forms. However, if one studies biology, it quickly becomes apparent that the word has a much broader range of meanings. The Grants are evolutionary biologists, and the evolution described in this book refers to the change in heritable characteristics of a population over time. This book presents the results of their 40 years observing patterns of change in several populations of finches on an island in the Galápagos. No, the finches didn't turn into a different kind of bird; instead, the Grants' observations are a gold mine for creationists wishing to understand natural history in a biblical worldview.

The book is very nicely illustrated, containing not only pictures but tables, charts, and boxes with more detailed information concerning what is discussed in the main text. It includes multiple appendices, a list of abbreviations, a glossary, references, and a subject index. Despite their best attempts to make the book as lay-friendly as possible, some of the chapters include rather technical population genetics concepts and discussion of analyses. The summary at the end of each chapter is helpful to gauge if the main concepts of the chapter were grasped. I found myself needing to reread portions of the book.



In fact, this review is being written after the third time I went through the whole book. I think that speaks highly to the value of the book: the basic concepts can be understood by reading the book once, but a deeper understanding is engendered by reading it multiple times a few years apart.

The draw of the finches on Daphne

The preface and early chapters spend a lot of time providing the context for their study, including relevant information about the Galápagos in general, and Daphne Major Island (hereafter, Daphne) in particular. As evolutionary biologists, the Grants are interested in knowing how new species form—a topic of great interest to creationary biologists as well. They discuss reasons for choosing finches on an island (i.e. a small population of easily approachable birds that can be marked for individual identification and tracked through time; figure 1). Their

method of tracking finch populations through time is what makes their work so valuable. It steps away from the armchair philosophy and just-so stories that predominate when looking at the current state of a population and attempting to infer how it reached its present condition.

As the bird species and the foods they eat are being presented, the Grants explain what brought them to Daphne in particular. Many islands contain both the medium and small ground finches (*Geospiza fortis* and *G. fuliginosa*, respectively). Daphne only harboured the former granivorous finch, but it was smaller than on other islands in the Galápagos. Thus, on Daphne, the medium ground finch not only occupies the niche it does on other islands, but also that of the small ground finch. The Grants were intrigued, and wanted to know why.

Drawing on previous work, particularly that of David Lack, they describe the concept of *character release*, or expansion into the niche

of a missing competitor. They list five assumptions of the character release hypothesis, and spend several chapters discussing how they went about demonstrating the veracity of those assumptions in their study on the Galápagos finches. It is when they list the five assumptions that the proverbial elephant enters the room. The listed assumptions are reasonable enough, but the variability to expand into a new niche has to come from somewhere. This is the primary blind spot of most evolutionary explanations. That is, there is a hidden assumption that appropriate variability is just sort of going to magically be there and natural selection gets the credit for any adaptation. Now, to be fair to the Grants, they do discuss sources of variability in the book (standing variation, interspecific hybridization, and mutation). However, they do not deal in depth with how *appropriate* variation shows up in *appropriate* timeframes, especially as it might relate to mutation.

Heritable traits and natural selection

For evolution (in the change over time sense, that no one denies) to occur, heritable variation must exist in the population. The Grants demonstrate that beak length, width, and depth are all highly heritable (and variable) in the medium ground finch (*G. fortis*). They also show that reproductive output varies with the amount of rain and available food, and thus has a heritability close to zero. The primary factor that affected successfully raising offspring that themselves reproduced was related to longevity. And longevity was related to survival during the dry season.

Four years into their study, the Grants observed natural selection in action. There was a drought that resulted in selective mortality. Beak depth was the strongest contributor, as a greater beak depth was necessary to effectively crack and consume the larger seeds that remained available well into the drought. This, and other related observations over the study, make it clear that natural selection does not always act slowly and imperceptibly bringing gradual changes for the good of the organisms involved, as Darwin had argued.¹

The Grants found that natural selection occurs most strongly when the environment changes. In the Grants' study of the finches, this was during the droughts. Not only did natural selection occur most strongly then, but it was inconsistent in the direction it acted. The first drought they observed resulted in a selective mortality affecting smaller-beaked birds. However, due to exceptionally wet intervening years that resulted in explosive growth of plants bearing smaller seeds, another drought resulted in selective mortality in the larger-beaked birds. This oscillating pattern of natural selection removes useful variation and can potentially

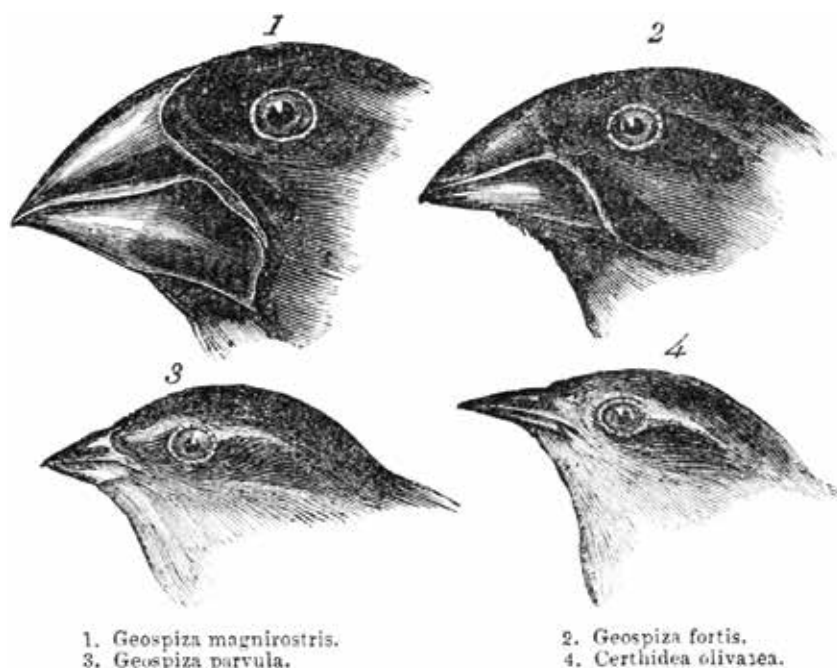


Figure 1. An example of the variation in beak size and shape among finches in the Galápagos. The large ground finch (1) and medium ground finch (2) were observed on the island of Daphne Major. The small tree finch and green warbler-finch (3 and 4, respectively) are found on other islands.

put the finch population at risk of being extirpated from the island.

As natural selection acted on the medium ground finches during the droughts, evolution resulted. This simply means that in the next generation there was a shift in the average beak size. However, other aspects of their study made it clear that even in cases where natural selection appears to be acting, evolution does not always result. Instead, the net effect of natural selection is influenced by antagonistic selection, which can occur on the same trait at different times, or on different linked traits at the same time. Thus, it is incorrect to say that natural selection is equivalent to evolution; it is merely one of several possible causes.

Character displacement

During the course of their study, the Grants also observed *character displacement*, the opposite of *character release*. In character displacement, competition between species can result in divergence between the two. The most striking example observed in their study is worth examining in more detail.

When their study began there were no large ground finches (*G. magnirostris*) that bred on Daphne. Occasional migrants would visit, but until a very favourable El Niño year (1982) none stayed to breed. One important observation made by the Grants is that of the migrants who visited, those that stayed to breed were not a random sample of the total visitors. They differed genetically (more heterozygous) and phenotypically (larger beaks) from those that left. This is significant because evolutionists commonly assume that colonization is random for their models of gene flow and statistical tests designed to detect natural selection.

The number of large ground finches increased slowly over the next decade, and then suddenly increased more dramatically. For many years there wasn't much competition between them and the larger-beaked medium ground finches (*G. fortis*). That changed near the end of a two-year drought (2003–2005) when the large seeds they both consumed were depleted. The death toll was heavy for both species. In the medium ground finch (*G. fortis*), there was a size biased mortality (the larger-beaked birds were more severely affected), but in the large ground finch (*G. magnirostris*) mortality was not size biased.

The size biased mortality was an example of natural selection in action, and evolution resulted. There was a dramatic drop in the average beak size for the medium ground finch population in the next generation. The Grants point out that this example of character displacement was not from constant, ongoing competition. Special conditions were required for it to occur. The reduction in average beak size of the medium ground finch was dramatic, and this measurement remained smaller throughout the rest of the study.

Hybridization and genetic correlation

It wasn't just natural selection that caused changes in traits, such as average beak size. Hybridization between the medium ground finch (*G. fortis*) and two other species (*G. fuliginosa* and *G. scandens*) was important as well. The difference was that hybridization was more persistent, occurring at low levels throughout the study. This is in contrast to the dramatic impact of natural selection operating during a drought.

There was no breeding population of small ground finches (*G. fuliginosa*) on the island, but sometimes migrants from this species would stay and

breed with the medium ground finch (*G. fortis*). Hybrid offspring which survived to reproduce would breed with a medium ground finch, which brought variation into the population. This was tremendously valuable, particularly after a drought which had selectively removed birds with smaller beaks. Birds with smaller beaks are much more efficient at consuming the smaller seeds, and this hybridization allowed the resident medium ground finch population to effectively exploit that resource again.

Hybridization between these two granivorous finches also explains the puzzle that brought the Grants to the island initially. The medium ground finch was relatively small on Daphne because it received genetic material from the small ground finches who occasionally stayed to breed. Rather than establish a population, which could have eventually led to competition between the two species, the small ground finch brought in useful variation. Since the medium ground finch on Daphne never hybridized with the large ground finch (*G. magnirostris*), it had no way to regain the lost variation in the larger size range after the drought depleted it in 2005.

A second factor that affects how a trait can change is how they are correlated. Beaks can vary in three dimensions: length, width, and depth. Often, two of the dimensions are correlated, and this has to do with the underlying gene expression differences that control beak size and shape.² While natural selection can easily shift the beak size up or down, changes in beak shape are more complex.

In addition to granivorous finches, Daphne is home to the cactus finch (*G. scandens*). In the granivorous finches, beak length and depth increase similarly with increases in size. In the cactus finch, beak length increases considerably faster than beak depth as size increases. The longer beak

facilitates feeding on the cactus plant (*Opuntia echios*; figure 2). While natural selection is less effective in transforming beak shape, hybridization between the two species broke down the correlation.

Coalescence or speciation

In the first few years of the study, there was a dramatic difference in beak shape between the medium ground finch (*G. fortis*) and the cactus finch

(*G. scandens*). Then hybridization was observed between the two species. It was never pervasive, as only a few individuals were involved in any particular breeding season. However, it became persistent, happening in most years. The hybrids would breed back to one of the parental species, bringing in new variation. As they did so, a dramatic shift in beak shape occurred. This was most noticeable in the cactus finch population, as it was smaller. Despite the adaptive advantage of

having a long beak to feed on cactus, the cactus finch beak became blunter from the incoming ground finch genes.

While hybridization can cause two different species to coalesce, as was beginning to happen in the above example, it can also have a different outcome. The Grants document this by tracing the offspring of a large juvenile that arrived on Daphne in 1981 and stayed to breed with the medium ground finches. In the book it was suggested to be a cactus finch/medium ground finch hybrid, perhaps backcrossed to a medium ground finch (based on microsatellite comparisons). Subsequent genome sequencing indicates it was actually an Española cactus finch (*G. conirostris*), originating from over 100 km away.³

Despite being 70% larger and singing a different song, this large male immigrant bred with the medium ground finch. Some of his smaller offspring continued to do so, and became absorbed into the *G. fortis* population. However, part of his lineage quickly (within three generations) began interbreeding only among themselves, forming a distinct population. Initially the Grants had no idea what the outcome would be, so they called this population the Big Bird lineage and continued to track it. For over 30 years, the Big Bird lineage has remained separate, thus qualifying it as a separate species under standard rules of taxonomy. Its beak size is between that of the medium and large ground finch populations. In addition to consuming seeds in the expected size range, this new species can effectively exploit cactus as a food source.

Singing and hybridization

In several different chapters, the Grants discuss the importance of song and morphology (i.e. size and shape) in choosing a mate. Young birds normally learn the song of their fathers, and the males sing it as an adult. Females recognize the song, and tend to mate with a male like their fathers. There



Figure 2. The Galápagos prickly-pear cactus (*Opuntia echios*) found on Daphne. Due to the greater length in their beaks, cactus finches are skilled at biting open the fruits and buds on this plant, as well as probing the flowers for nectar.

are a few circumstances that can cause a breakdown in this pattern, including the death of the father during the formative years of the young. Occasionally, a young bird might learn the song of a neighbour, which might not be of the same species.

In cases of hybridization between the medium ground finch and the cactus finch, the offspring would breed back to the paternal species. Song and morphology appear to be the reason why. In the case of the Big Bird lineage, these appear to be the factors that prevent them from hybridizing with other finches on the island. Thus, the main reason the species remain separate is behavioural, rather than the inability to produce viable, fit offspring.

Extrapolation

In the last few chapters, the Grants summarize their major findings, including the long-term effects they observed from both natural selection and hybridization. They point out that there is an ebb and flow of various morphological traits over time, and that species can be ephemeral. They use what they have learned to make inferences about the past (through a molecules-to-man evolutionary lens) and the future. Except for the timeframe and the assumption of universal common ancestry, they make a number of points that are quite reasonable in a creationary worldview as well. What is missing from the discussion is a sense of awe for the Creator who provides for these birds even in a changing, sometimes hostile, environment in our fallen world (Matthew 6:26; Luke 12:6–8).

What does this mean for creationists?

One of the more obvious implications of the Grants' work is that natural selection does not operate as many evolutionists have traditionally

claimed. The Grants' observational data helps expose some of the poorer arguments that have been used to support natural selection as the dominant explanation for the variety of species we see today. Consider the following quote from the *Understanding Evolution* website (a collaborative project of the University of California Museum of Paleontology and the National Center for Science Education):

"An adaptation is a feature that is common in a population because it provides some improved function. Adaptations are well fitted to their function and are produced by natural selection."⁴

This is utter nonsense; no trait can be *produced* by natural selection! The trait must already exist in the population (standing variation), or be brought in by some means (migration, hybridization, or mutation) within a timeframe where it can be helpful. Once the trait is in the population, natural selection is one of several possible mechanisms by which the trait can increase in frequency, and thus become common. Other mechanisms that can alter the frequency of a trait include migration (in or out, based on suitability of traits for that environment), hybridization, and meiotic drive (a well-known type of non-Mendelian inheritance that needs to be considered in future studies).

It is realistic to view natural selection as a shaping force. It can result in divergence by eliminating overlapping phenotypes between two species. It may, at times, explain why certain variations are uncommon or absent. It is also one factor that may contribute to the formation of a new species, especially through allopatric speciation. While the latter wasn't directly observed in the Grants' study, they do provide examples of divergence between the same species on different islands associated with different environmental conditions. If this continues long enough, it could result in speciation.

However, in contrast to claims of 'armchair' evolutionists, natural selection is not an explanation for any adaptation because it does not explain the origin of any trait. It was observed to be intermittent and oscillating, in contrast to Darwin's belief that it was continuous and always worked for the benefit of the organisms involved. Natural selection is not the major factor involved in the diversification of the kinds God created at the beginning, but hybridization between species can now be seen as another important component of God's providential care for his creatures.²

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A detailed rehash of all the canned anti-creationist shibboleths

God's Word or Human Reason? An inside perspective on creationism

Jonathan Kane, Emily Willoughby,
and T. Michael Keesey

Inkwater Press, Portland, OR, 2016

John Woodmorappe

The title of this book borders on intellectual dishonesty. It is not an inside perspective on creationism at all, as the unsuspecting reader is apt to think. It is a slick repackaging of old anti-creation claims—some of them several decades old now—along with several oft-recycled sob stories of former creationists. All the authors claim to be former Young Earth Creationists, but now apparently two are atheists, two are Christians, and one is a deist.

This book machine-guns so many issues that it is impossible to analyze more than a fraction of them in one review. On first impression, it seems scholarly, as it is extensively packed with information. However, to the discerning reader, it soon becomes obvious that the ostensibly impressive technical information goes along with rather superficial reasoning.

The geologic arguments against the Flood are the same-old, same-old (e.g. purported mud-cracks). I confess to an element of weariness in addressing them over and over and over again—as in the case of my recently published rebuttal book review.¹

Some of the arguments in this book cover recently made evolutionary

claims—many of which have already been answered in recent issues of *Journal of Creation*. For instance, there is the one about the ‘mutation’ that enables bacteria to eat nylon, which has been examined by creationist scholars and found wanting.²

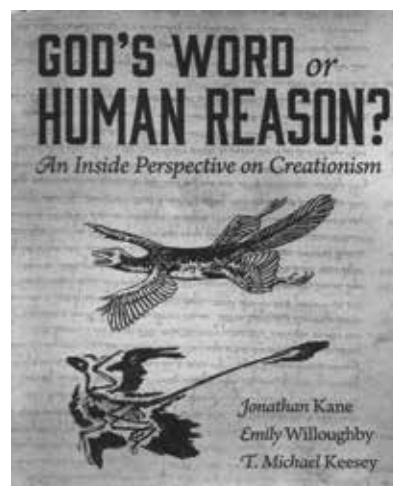
There are also many criticisms of the findings of the RATE (Radioactivity and the Age of The Earth) Project. These, too, have been answered.³

Admitted evolutionary propaganda by the media

One of the few sensible features of this book is its candour about the way the media handles evolution. The authors quip:

“The problem is often exacerbated by journalists, with their desire to present every discovery as a major news story. Stating that a discovery overturns everything we knew about our evolution always makes for an attention-grabbing headline, even when in reality only a small part of our understanding has been modified. Before taking an overblown headline at face value, it’s always worthwhile to look up the original paper it discusses” (p. 234).

The authors do not take this far enough. Could the much-lamented fact that a large fraction of Americans do not believe in evolution, and do not trust the media, stem in large part from the fact that Americans sense that they are being propagandized?



Ah, those ex-creationists— yet again

What about those who claim that ‘the evidence’ forced them to abandon creationism? Being intimidated by a scientific challenge can point to nothing more than an inflated sense of the authority of autonomous human reason, a lack of scientific imagination, and/or, unfortunately, a lazy unwillingness to confront the challenge.

Glenn Morton, featured in this book, is instructive. While a professing creationist, he was so locked into a uniformitarian mindset that almost all he wrote about was the impossibility of creationist models. At the first International Conference on Creationism (1986: I was there and I personally heard him), Morton was dismissive of suggested solutions to the problems he found with creationism. So, once Morton abandoned creationism, he was not showing his true colours. He had already shown his true colours long ago—in fact, from the very beginning. More on his ‘Mortoniana’ below.

The old horror stories in this book (which I have tried but been unable to verify), of numerous creationist geologists losing their faith upon joining the oil industry (asserted, for example, by Glenn Morton), are,

predictably, undocumented as well as selective. What about professional geologists who were and who remain committed creationists? Consider also those geologists who were once doctrinaire uniformitarians but who became diluvialists (I know some).

Baron Cuvier began to think of many ‘revolutions’ in Earth’s history because he could not imagine how a single Flood could account for all the different fossils and formations. In like manner, quite a few ex-creationist geologists had started out as neo-Cuvierists. They had drifted into insisting that large fractions of the Phanerozoic fossil record must be pre-Flood or post-Flood, because, after all, such-and-such requires a special non-Flood explanation, and/or such-and-such needs a very long time to form. As this mental cancer grew in their thinking, there was, before long, no place for the Flood at all. Not surprisingly, the authors of this book have, fairly using basic logic, exploited the neo-Cuvierists as ‘proof’ of the entire impossibility of the Universal Deluge (p. 49).

The same mental bug can infect scientists in non-geologic fields. I once interviewed a prominent then-professing creationist physicist who insisted that both the dendrochronological and C-14 records must be correct, going back at least 10,000 years, because they agree with each other. He simply accepted a published article as gospel truth, without so much as a glimmer of divergent thinking. I asked him if he had personally studied the crossmatching of tree rings, or examined the raw C-14 data himself. He freely admitted that he had done neither. When I then asked him why he was not withholding judgement until he had at least done *something* along these lines, he summarily brushed it off. He also insisted that “Attempts to overturn this have failed.” But there had been no serious efforts to do so up to that time! So I asked him if he

had, at bare minimum, tried to come up with an alternative explanation for the evidence. He indicated that he had not. With this kind of abjectly defeatist mentality, the writing on the wall was clear, and I was hardly shocked when he soon abandoned creationism entirely and vanished from the scene.

Creationism discredits Christianity—yeah, right

This time around, this timeless compromising evangelical chestnut is seemingly backed up with surveys (p. 292) that purportedly indicate that, of those who left the church, some 30% stated being ‘turned off’ by creationism, or reckoning the church ‘anti-science’, as one of the reasons behind their departure. To begin with, this was an option that could be checked off in a survey so, at least in part, it was a leading question.

Excuses, excuses. They are so easy to make, especially when abandoning the church. What if I were to drop out of church and, as my excuse, said that I was tired of its lack of resolute stand against evolution, its lack of support (with *very rare* exceptions) of creationist scholarship, and its overall superficiality, timidity, and lack of fervour?

Let us say that the survey is accurate. For someone already rejecting the authority of part of the Bible, why is it supposed to be so difficult to proceed to the rejection of the authority of the *entire* Bible? For someone so obviously conformed to this world (Romans 12:1), and moreover sufficiently in love with the world’s system to leave the church, as did Demas (2 Timothy 4:10), why should it be remarkable that he/she would also dislike challenges to evolution—the very icon of the world’s system?

An abandoning of faith and practice, to one degree or another, is nothing new and nothing remarkable. Jesus Christ never used His power to force his

followers to continue with Him (John 6:66–67), and the individual has always been confronted with the choice of following man-made devices (idols of some sort, including—yes—evolution) or following God (Joshua 24:14–15).

Western Europe, the nest of higher criticism and Darwinism, provides an instructive test of the creationism-discredits-Christianity accusation. There, creationism barely registers at all, and evolution is more universally believed than just about anywhere else. So, therefore, Christianity should be more esteemed, and more vibrant, in Western Europe than just about anywhere else. Precisely the opposite is true. Christianity is virtually dead, and even so-called cultural Christianity is waning.

The foregoing also applies at the personal level. Whoever heard of an atheist who, having become impressed with Christians spurning the Bible and accepting evolution, chose to reconsider his atheism?

This whole silly creationism-discredits-Christianity escapade reminds me of American atheists who say that, were oral prayer to be re-introduced into US public schools, it would only hasten the demise of Christianity. Were that true, or were they sincerely convinced that it was true, American atheists would then be the biggest champions of prayer in schools instead of its most bitter enemies. Likewise, if creationism indeed discredited Christianity, atheists would be the first ones lining up and militantly demanding that it be taught in classrooms alongside evolution!

A rehash of all the standard compromising evangelical and modernist memes

This book trots out the old line that creationism and the young Earth make God out to be a deceiver. In reality, we are the ones that deceive *ourselves* when we confuse our interpretations of

nature with the facts of nature, and even more so when we disbelieve God's plain teachings in Scripture.

The authors try to minimize the significance of creationism and the Universal Deluge by stating that Cyrus Ingerson Scofield and Benjamin B. Warfield, despite their high view of Scripture, variously doubted the literalness of the seven days and did accept organic evolution. But, beyond showing the fallibility of human teachers and the deficient conception of biblical inerrancy held by Scofield and Warfield, what else is this supposed to prove?

Interestingly, the authors claim that the Hebrews got the seven-day week from the Sumerians. (p. 286). If true, so what? Far from undermining the seven-day Creation, it actually reinforces it. An ancient Hebrew, seeing that the Sumerian, despite having long forgotten the One True God, nevertheless observes the seven days, would see the seven days as very concrete and fundamental (recognized even by some pagans), and would be all the less likely to think of the seven days as mere literary devices, metaphors, or side issues!

The line between compromising evangelicals and totally apostate churches is getting blurrier and blurrier, and this book continues the trend. It accepts JEPD as fact (pp. 282–on), and repeats the standard modernist line on the many 'errors' in Scripture. As of 2016, over 13,000 Christian clergy, of many denominations, have signed a declaration of support for evolution—a declaration largely initiated by Unitarian Universalist communities (p. 275).

Those testable predictions—whose?

The authors identify some failed evolutionistic predictions (p. 175). But note the special pleading: When evolutionary predictions pan out, it

is powerful evidence for evolution, but if they fail, then—oh well—that just goes to show the self-correcting nature of science. Heads I win, tails you lose. Evolutionary hypotheses or deductions can and are being falsified, but evolutionary theory itself is always protected from falsification.

The authors claim a fulfilled evolutionary prediction when it comes to the similarity of human HIV and chimp SIV (p. 177). This argument attests to human-chimp similarity but begs the question about the *origin* of this similarity. Common sense alone would generally predict that the engine of a car could more likely successfully be swapped with that of a like-sized car than that of a truck. But this elementary deduction hardly means that the two like-sized cars diverged from a common ancestor more recently than either did from that of the truck. Still less does it indicate that either cars or trucks arose by evolution in the first place.

The HIV/SIV argument is intellectually dishonest. There is nothing in evolutionary theory *itself* that specifically predicts, *in advance*, the biomedical compatibility (or, for that matter, incompatibility) of particular chimp features with humans. Whether arising from evolution or special creation, these can only be determined by experimentation!

But let's play along, for a moment, within the evolutionist's mental box. He still loses. Biomedical considerations are not limited to evolutionary cousins. For instance, porcine organs have experimentally been xenotransplanted into non-human primates with considerable success,⁴ even though the two are not close evolutionary relatives at all. In fact, they belong to separate orders (Artiodactyla and Primates).

Let us now look on the other side of the aisle.

A recurrent complaint in this volume is the one that creationism

makes no predictions, and has otherwise contributed nothing to enhance our understanding of the natural world. I beg pardon.

To begin with, if God had been involved in nature, what could possibly be a more important contribution to science than freeing it from its rationalistic prison?

Must we be reminded, yet again, of the many pioneering scientists who made pivotal discoveries, and who were active creationists? Think of Newton, Linnaeus, and Mendel, to name a few.

Now consider the recent decades. For the longest time, evolutionists had dismissed the discontinuities in the fossil record as artefacts of an incomplete fossil record, insufficient sampling, etc. By eventually adopting the punctuated equilibrium concept, evolutionists have come around to tacitly admitting that the creationist prediction—about the reality of the discontinuities—was in fact correct.

Let's extend paleontology to cladistics. By abandoning the old view that ancestor-descendant relationships could be inferred from the fossil record, evolutionists have come around to adopting what creationists had been saying all along (that it is meaningless to speak of ancestor-descending relationships among fossil organisms), though of course not as separately created living beings.

For the longest time, evolutionists emphasized vestigial structures, and countless needless appendectomies (including on my grandmother) have been performed. Creationists predicted that functions for them would eventually be found. That is exactly what happened.

The foregoing applies also to the molecular level. Evolutionists kept telling us about the uselessness of their so-termed junk DNA, and the assured dysfunction of pseudogenes. Creationists predicted that ignorance of function is not synonymous with

an absence of function, and, more and more, their predictions are being proved right.

So much for biology. Consider geology. Creationists had warned about the tentativeness of stratigraphic ranges of fossils, and their predictions have been validated. Although the geologic ages are never questioned, stratigraphic-range extensions of fossils—not a few of them spectacular—have become almost the norm.

Classical Lyellian uniformitarianism had long taught that geologic changes almost always occur very slowly. Catastrophism was all but a naughty word—an ignorant throwback to pre-scientific thinking. Creationist geologists, on the other hand, had predicted the ubiquity of rapid geologic change. Now conventional geology has redefined uniformitarianism to encompass frequent catastrophic changes (including global catastrophism), although of course still within the standard framework of the geologic column.

For the longest time, conventional geology had repeated the mantra that coal and oil take countless millions of years to form. Creationist geologists had predicted that these could form

rapidly, and were eventually proved correct.

Finally, evolutionists pay tribute to creationist predictions even when they would not be caught dead admitting it. Consider intelligent design and specified complexity. Evolutionists smugly and summarily dismiss these as appeal-to-ignorance ‘God of gaps’ thinking. Yet that is exactly the way they reason whenever they engage in SETI (the search for extraterrestrial intelligence). As they listen in to radio signals hoping to discern messages coming from extraterrestrial civilization, as opposed to radio ‘noise’, they are thereby validating the factuality and practicality of creationist concepts of intelligent design and specified complexity.

Evolutionary reductionistic fallacies at the bird-dinosaur and hominid-human junctures

In this book, the authors variously argue that there is no unambiguous, or even agreed-upon, demarcation between theropod dinosaurs and birds, and between pre-human hominids and humans. The premise itself is, at best, dubious (see below). However, let us say, for the sake of argument, that these

premises are true. The logic is flawed. Shoes and boots grade into each other, and there is no morphologically clear-cut, or even arbitrarily agreed-upon, boundary between them. Does this mean that ‘shoes’ and ‘boots’ are arbitrary categories? Hardly. Must we now rationally accept that boots evolved from shoes, or that both evolved from a common ancestor? An even greater *non sequitur*.

An obvious reductionist fallacy is created by confusing incidental similarities (e.g. those between chimp DNA and human DNA) with substantive ones (the respective capabilities of chimps and humans). As the late Duane T. Gish pointed out, it is like saying that watermelons (98% water) are almost identical to clouds (100% water).

Another layer of reductionist fallacy stems from the constraint on our thinking that is encouraged by the limited morphospace of currently living creatures, combined with the usual evolutionary memes. To take an extreme case to make the point: The reader is asked to imagine that the only known mammals are the whales and the bats. Then humans are discovered, and evolutionists argue about their status. Humans come to be understood

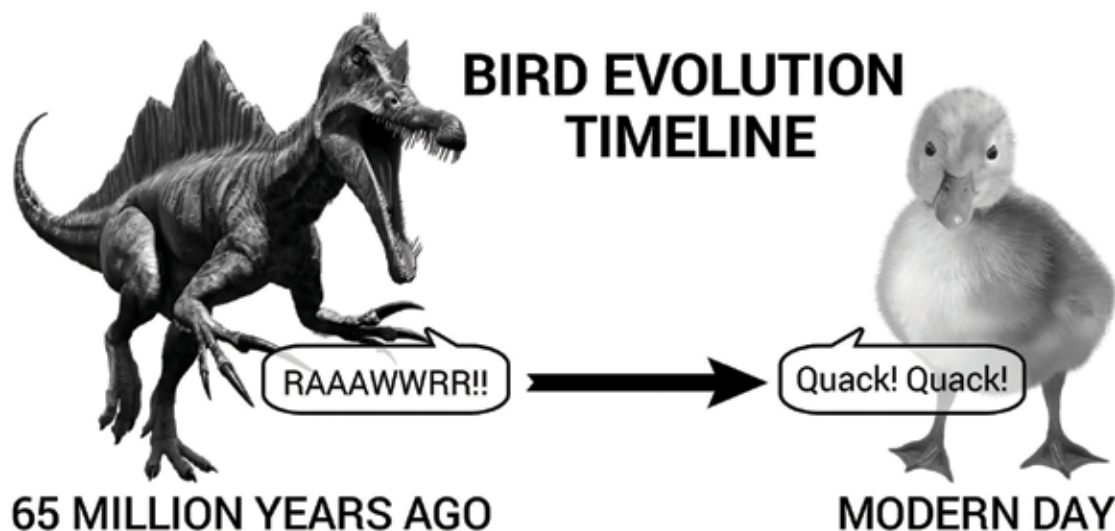


Figure 1. A satire of sorts of the theropod-to-bird evolutionary scenario

as mosaics of whale and bat features, and the disagreements of scientists, about whether humans are essentially whale-like or essentially bat-like, is then cited as proof of evolution in general and for the arbitrariness of the whale-human-bat transition in particular!

Any talk of a blurred bird-theropod or non-human-human juncture, on putative osteological grounds is, at best, disingenuous if not manipulated. Numerous papers that I have published in the *Journal of Creation* demonstrate the fact that the relevant cladograms, upon close examination, feature the following: very common morphological discontinuities between traits; *ad hoc* ‘specialized’ labels for non-fitting traits; trait-reversals (more-crownward features often becoming *less* derived than some of the more-stemward features); violations of stratomorphic intermediacy, etc. This is notably true of the inferred theropod-bird juncture⁵.

Another level of evolutionistic reductionist fallacy involves the confusion of traits as listed with the *integrated functionality* of the traits of an organism. For instance, Australian Aborigines, compared with other modern humans, share a number of features with *Homo erectus*,⁶ but only a foaming racist would suggest that native Australians are therefore somewhat less human than the rest of us—as indeed many early Darwinians did. As for fossil hominids, when the traits are reckoned as integrated (as opposed to individual) units, there are in fact clear-cut discontinuities between major groups, at least according to some analyses.⁷

Finally, the biggest reductionistic fallacy of all is the one that virtually ignores the numerous, fundamental, non-osteological differences of birds from all other forms of life.⁸ This has evidently led to a bit of satire (figure 1).

At least, to their credit, the authors admit the speculative nature of the origins of flight, as they write:

“We do not yet know all the ways that feathered dinosaurs used their wings, or in what order these functions occurred during the evolution of flight, but in some cases it is possible to narrow it down” (p. 156).

So evolutionists clearly know much less than they dogmatically say they know.

The reductionism is even more egregious when it comes to the glossing over of the fundamental differences between humans and non-humans (figure 2). To realize this, the reader is asked to imagine what would happen if the ardipthecines, australopithecines, habilines, erectines, and archaics (p. 234) were all brought to life. Would we see a complete gradational continuum of cognitive, rational, moral, and religious capabilities, spanning (for reference) the extreme of chimps on one end and today’s humans on the other? Of would we still see a clear-cut distinction of humans and non-humans, notwithstanding any real or imagined osteological continuum between them?

‘Mortoniana’—re-exhuming 40-year-old discredited arguments

This book laughably repackages Glenn Morton’s old assertions that misrepresent my position, and—more importantly—misrepresent essential facts. There is the old saw about me “setting out to prove that the geologic column did not exist” (p. 19). This is utter nonsense: I already knew that the geologic column did not exist, and this is not changed by the fact that 1% of Earth’s land surface has representatives of all 10 Phanerozoic geologic systems in place. My work was simply a measurement exercise on the geographic and stratigraphic distribution of Phanerozoic systems.

Another ‘Mortoniana’ asserts that we should expect many missing intervals of strata because sedimentation is not continuous everywhere (p. 21). Morton is openly begging the question—*assuming* the very existence of the very-old steady-state Earth that he is trying to defend!

Now consider Morton’s ‘pan in the bathtub’, wherein the continents and ocean basins are naively compared with a pan, situated at the bottom of a bathtub, covered by a thick layer of water. According to this ultra-simplistic conception of the real world, most of the sediment in the water will fall not on the pan but on the floor of the bathtub. Consequently, the shortage of sediment on the ocean floor is imagined to be a problem for Flood geology.

Now back to the real world. The Floodwaters were only a few kilometers deep—negligible compared with the thousands of kilometres of continental width. Consequently, unlike Morton’s ‘pan in the bathtub’, the free movement of water-borne sediments into ocean basins was very limited. That is, it was much more probable for sediment to be deposited somewhere on the continent than washed out into the deep ocean. And that is not all. Any movement of currents in non-synchronous directions caused ‘traffic jams’ that facilitated the stranding of sediments on continents. In addition, to the extent that the main currents consisted of ocean water flowing onto continents, sediments were all the more likely to remain entrapped on the continents. Finally, the action of geosynclines on continents acted as ‘sinks’ that further entrapped sediments on the continents. For these reasons, and still others that could be mentioned, the ‘pan in the bathtub’ is invalid.

Enough ‘Mortoniana’. Its re-exhumed presence in this work speaks volumes about the shoddy thinking behind the anti-creationist position in general and this book in particular.

Evolutionistic special pleading—more of the same

Use of embryonic recapitulation (of sorts) as evidence for evolution in general, and more so for a specific evolutionary step, as done in this book (e.g. the theropod-bird junction) is an exercise in special pleading. For instance, given the fact that the unborn human child has a relatively large head, we would have to conclude that we must have evolved from large-headed ancestors. Were this actually believed by evolutionists, the relatively large head in the human foetus would undoubtedly be cited as a powerful evidence for evolution.

This book features an impressive-looking table of anatomical details showing a nested hierarchy of humans, great apes, and ‘lesser’ primates (pp. 229, 301, 305). It conveniently ignores the many convergent (homoplastic) features, including at the molecular level, that violate evolutionary nested hierarchies.

The irreducibly designed mousetrap

The authors dig up the old mousetrap counterargument on irreducible complexity. The latter is imagined to be nullified by the fact that a triggerless mousetrap can still function as a slingshot or paper clip. At best, this illustrates a single functional intermediate step that nevertheless ignores all the other nonfunctional steps before and after it. Thus, as long as the wooden platform is too thin, the assembly rips apart. As long as even one hinge is inadequately attached, the assembly flies apart. As long as the wire is too thin, it bends or breaks. As long as the spring is too weak, no contraption exists. As long as an otherwise adequately strong spring is mispositioned, there is no clamping or propulsive action possible. So, unless and until *all* these conditions are simultaneously met, there can be no clamp or slingshot that could be preserved and “eventually improved

by natural selection”. In other words, before there can be survival of the fittest, there must first be the *arrival* of the fittest.

Furthermore, the foregoing applies only to a clamp or slingshot. A mousetrap has a vastly more complex function, and it will not work even minimally, so that “natural selection can improve it”, unless and until there is a properly sized, properly shaped, and properly deployed trigger mechanism. Therein is yet another level of irreducible complexity.

Conclusions

This information-packed book, seemingly impressive at first, turns out to be a big, boring rerun of old anti-creationist claims, many of which had been answered long ago. Having reviewed many anti-creationist books, I must confess to a certain tedium with their redundancy, superficiality, and intellectual poverty.

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Figure 2. Fossil hominid skull display at The Museum of Osteology supposedly representing the evolutionary progression to modern humans. This superficial ‘line-up’, if nothing else, completely glosses over the fundamental non-osteological differences between humans and non-humans.

The Catholic revival of creation science

Creation, Evolution, and Catholicism: A discussion for those who believe

Thomas L. McFadden

Institute for Science and Catholicism, Front Royal, VA, 2016

Michael J. Oard

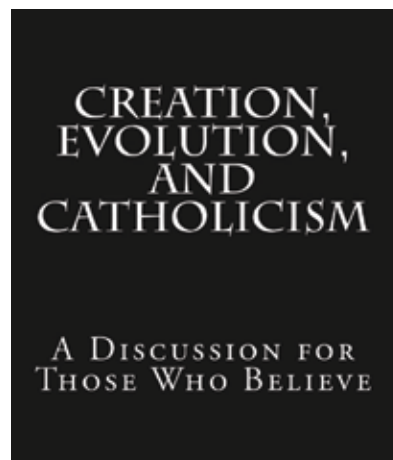
Compromise on Genesis 1–11 has become increasingly rampant, not only in the Protestant churches, especially the mainline denominations; it also has greatly influenced the Catholic Church. Unlike those in evangelical churches, Catholics' returning to the biblical and traditional beliefs in Genesis 1–11 has been slow. Nevertheless, it has begun with the founding of several organizations that offer seminars and talks and several books, of which the one under review is the latest.

Years ago, Thomas McFadden became aware of skepticism among Catholic teens while teaching courses in Catholic Christian Doctrine (CCD). These courses take place normally about one hour a week and are designed for Catholics who attend government schools. He discovered while teaching that the students' unbelief in the supernatural biblical doctrines was often a direct result of their acceptance of evolution. His suspicions were supported by a study done by the Pew Research Center which documented why Catholics have been leaving the church and Christianity in droves, and why those that still practise their faith do so timidly. The main reason Catholics gave for leaving the church was that 'science' disproves the Bible. McFadden also learned that the

majority of American Catholics accept evolution from molecules to man as factual. The Catholic theologians taught in seminaries that the Bible and 'science' can be reconciled by theistic evolution. The students realized that both the Genesis account and evolution couldn't both be right at the same time, so they rejected the compromise and later left the Catholic Church. The average age the children were lost was 13 years; often their unbelief was not necessarily a conscious decision.

Catholic Church leaders clueless

Most distressing to the author is that most of the leaders in the Catholic Church, from the last few popes down, have been theistic evolutionists and unaware of the main reason why so many young people have left the Catholic Church. As a result, McFadden is working to wake up the Catholic Church and make them aware of the abundant scientific evidence supporting creation and the Flood. For that purpose, he started a creationist organization, Institute for Science and Catholicism, and wrote this book. McFadden is not the only Catholic who sees the problem clearly. Other Catholic creation science organizations are the Kolbe Center for the Study of Creation, and, in Europe, the Daylight Origins Society. As an engineer, McFadden has educated himself on the creation/evolution issue through the help of various creation science organizations, especially *Creation Ministries International*. He has discovered that there is a plethora of scientific evidence supporting biblical creation. He has also learned that evolutionary origins stories are clearly based on the worldview of naturalism or atheism, the advocates of which have dominated science and



the culture. *Creation, Evolution and Catholicism* is written for non-scientist Catholics, namely parents, priests, and mature students.

The influence of Teilhard de Chardin, S.J.

About two thirds of McFadden's book is devoted to explaining how evolution came to be accepted by the Catholic Church. He mentions the pivotal influence of the Jesuit priest and paleontologist Pierre Teilhard de Chardin, S.J., who was involved in the Peking Man discoveries and the Piltdown Man fraud. De Chardin also wrote several amazingly popular books, including *The Phenomenon of Man* and *The Divine Milieu*. These books are creatively written in high philosophic language, trying to reconcile evolution to a very loose interpretation of Scripture. In apparent recognition that evolution devalues both God and man, de Chardin attempts to refute that with man-exalting language that is not only confusing but fallacious. The book's appeal is to the pride within all people. In once trying to read these books myself, I certainly agree with McFadden that these two books are theological fiction, vague, and very difficult to understand. Although the Catholic Church tried to ban de Chardin's books, they became even more popular and apparently are still popular among Catholics.

Humani Generis taken out of context

Humani Generis, the English title of which is *The Human Race: Some False Opinions Which Threaten to Undermine Catholic Doctrine*, is an encyclical written by Pope Pius XII (1939–1958) in 1950. This encyclical is claimed to have opened up the belief in evolution by Catholics because of a portion of paragraph 36:

“For these reasons the Teaching Authority of the Church does not forbid that, in conformity with the present state of human sciences and sacred theology, research and discussions, on the part of men experienced in both fields, take place with regard to the doctrine of evolution ...” (p. 109).

This statement has been taken out of context by evolutionary advocates and been claimed to be a *carte blanche* for accepting evolution. However, the same paragraph also says the following:

“However, this must be done in such a way that the reasons for both opinions, that is, those favorable and those unfavorable to evolution, be weighed and judged with the necessary seriousness, moderation and measure, and provided that all are prepared to submit to the judgment of the Church ...” (p. 109).

This procedure, of course, was not followed. Evolutionary advocates paid no attention to the fact this encyclical was mainly a warning for uncritically accepting evolutionary philosophy that was infiltrating the Catholic Church. These advocates continued at a feverish pace to undermine the Catholic Church. Through the years, secular humanists have taught students misinformation and biased ‘facts’, including putting out blatant propaganda, such as the completely distorted movie *Inherit the Wind*, which is supposed to be a dramatization of the 1925 Scopes Monkey Trial.

The wise may wonder why advocates of evolution feel the need for

distorting the facts. This movie is just one of many fabrications of the trial. If it is so easy to disprove creation, why do they resort instead to lies and mockery? If the case for evolution is solid, why do they feel the need to use the courts to block the discussing of evidence against evolution?

Catholic compromise runs deep

McFadden gives many examples of Catholic compromise but he points out that both Pope Pius XII, and Leo XIII, (1878–1903) before him, were against the evolutionary hypothesis and believed strongly in the straightforward meaning of Scripture. After Pius XII, the popes rarely mentioned evolution, but a great number of lesser officials promoted it, of whom McFadden gives us typical examples. Pope Benedict XVI, previously known as Cardinal Ratzinger, brought up the subject a few times, but his admonitions were vague enough to be distorted and ignored.

The current Pope, Francis, has been no help. He has come out quite positive toward belief in evolution, which is not surprising because of his Jesuit education: “Pope Francis is also a victim of the scientific method which was part of his evolution-laced Jesuit formation” (p. 126). Of course, it is not the scientific method that is at fault—which can be a great benefit if applied correctly and without scientism—but the worldview of naturalism. Pope Francis also seems to take all the advice of the Pontifical Academy of Science, all the members of which are evolutionists.

Evolution advocates bring up the usual ‘cautions’ to attempt to stop inquiry, such as that the Catholic Church persecuted Galileo, and, therefore, the Church should simply accept what scientists say. Because of this constant refrain, McFadden has an online article on the Galileo affair, showing that evolution advocates have turned the affair on its head.

And there is the usual excuse given by advocates of theistic evolution that returning to belief in the straightforward meaning of Genesis 1–11 will turn away too many people. It is interesting that the author has discovered that the opposite is the case:

“Many people in the church claim that consistent creation teaching ‘turns people away from the Gospel’. However, both logic and many testimonies find exactly the opposite: *capitulation on creation* turns people off the Gospel! Conversely, consistency on creation has helped many to realize the consistency of the Gospel message [emphasis in original]” (p. 148).

A small step in the right direction

McFadden gives us the bad news throughout most of the book. However, he suggests a plan of action for the Catholic Church, emphasized especially in his last chapter. He says that it would be useless to get the hierarchy on board; it has to be a grass roots effort:

“Indoctrination in evolution is a contributing factor to the alienation of Catholic youth that can, and should be, countered at the parish level by the mutual cooperation of parents and clergy to first educate themselves on critical matters which are now ‘below the radar’, so to speak” (p. 159).

Self-education is not that difficult, since there is an overwhelming number of resources available, much of it free online, including the CMI website, that have been developed by Evangelicals, who have led the way.

I highly recommend this book for Catholics. It is also helpful for Protestants to understand how the Catholics are fighting the same battle against the watering down of Scripture. Although there is some mention of uniquely Catholic doctrines, the book is very encouraging and informative.

The feminine side of eugenics

Hitler's Furies: German women in the Nazi killing fields, 4th edition

Wendy Lower

Houghton Mifflin Harcourt, Boston, MA, 2013

Jerry Bergman

A rarely known aspect of the Holocaust was the important role women played in the movement, even in the racial-eugenic killings. Part of the reason why little was known until recently was because hundreds of women were called to testify against the men as witnesses and “many were very forthcoming, since prosecutors were more interested in the heinous crimes of their male colleagues” (p. 2).

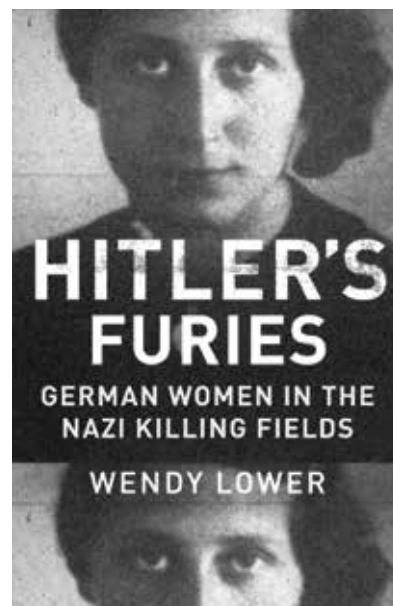
Another factor is women in general were widely viewed as incapable of the level of violence existing among men in general. Or if female involvement is mentioned at all, it would be some ostensibly exceptionally brutal death camp guards such Irma Grese, Maria Mandl, or Jenny-Wanda Barkmann, hanged for their crimes after the war. But Professor Lower also documents the involvement of many ‘ordinary women’ in Germany—mothers, teachers, and nurses—all careers we associate with compassionate personalities, not killers (p. 4). She writes:

“The role of German women in Hitler’s war can no longer be understood as their mobilization and victimization on the home front. Instead, Hitler’s Germany produced another kind of female character at war, an expression of female activism and patriotism of the most violent and perverse kind (p. 119).”

Wendy Lower, John K. Roth Professor of History and George R. Roberts Fellow at Claremont McKenna College, is a consultant for the Holocaust Memorial Museum in Washington, D.C., and a researcher in Eastern Europe where the eugenic race genocide occurred. Her in-depth research sheds much-needed light on one aspect of WWII that has been ignored for decades. One major review, although it noted a few writing shortcomings, was very supportive of her strong conclusions.¹ The ironic fact is, the “consensus in Holocaust and genocide studies”, the author writes, is that the “systems that make mass murder possible would not function without the broad participation of society, and yet nearly all histories of the Holocaust leave out half of those who populated that society, as if women’s history happens somewhere else” (pp. 13–14).

One method to help determine the motivations of the women who were involved in the Holocaust is from the letters they wrote home. A good example is one woman who discussed the non-Aryan issue and Nazi goals, namely the problem of the “admixture of blood between the controlling strata, the German element and the foreign people ... [which] would be a cardinal breach of our understanding of the need to preserve our Nordic racial inheritance and our future” (pp. 5–6). Her study carefully documents the overriding concern of the Nazis for eugenics, even calling it a race war involving the Aryans against inferior races, and the problem of racial degeneration caused by sex with non-Aryans (pp. 23–24).

To achieve this racial goal, women must “raise ordinary Germans’



racial consciousness” because it was especially the females that had to understand what the Nazi’s claimed was the problem of lecherous Jews having sexual designs on young German women (pp. 26–27). The education of girls included ‘racial hygiene’ (*Rassenhygiene*) instructed by genealogical charts to help the students become aware of their racial bloodline and who were Aryans and who were not (p. 27). This indoctrination primed some of them to express violence later on when they officially became part of the Nazi movement.

Based on two decades of research and interviews, Lower documented the central role of women in Nazi Germany, focusing on the women who participated in the Nazi extermination of the Jews. She concluded that German women had a major role in perpetrating the Holocaust based on the same reasons the men had. These women, whom the author calls Hitler’s Furies, a reference to the mythological ‘goddesses of vengeance’, actively took part in the murders of Jews and looting Jewish property. Himmler, Goebbels, Göring, and Speer usually get centre billing, but evidence is

presented that the women behind the men played a critical role.

Nurses

The major profession of women involved in the Nazi genocide was nursing. Nurses were specially counselled about the importance of ‘racial hygiene’. A major role they played was to participate in the selection of the mentally and physically disabled and to escort them to their death by lethal injection, and later in gas chambers. They also worked in infirmaries and concentration camps, not only with prisoners, but also with traumatized Nazi soldiers. In short, they “were the primary witnesses of the Holocaust” (p. 43).

Many young girls were receptive to the Nazi nursing profession due to the racial biology indoctrination they received in school. As a result, shortly after Germany conquered Poland, 15,000 were recruited. To be fully accredited, they had to prove their Aryan racial status. Not unexpectedly, of “all the female professions, nursing contained the highest concentration of documented crimes”, mostly in the euthanasia program and medical experiments done in the concentration camps (p. 50). Of note, Lower claims, is that involvement in the euthanasia program was “absolutely voluntary” (p. 51).

The nurses were influenced by the fact that “a core of male and female medical professionals increasingly turned to ‘racial science’ to deal with problems that concerned women” (p. 18). Lower related the career of one very well-educated, bright woman named Pauline Kneissler, who was involved in the Aktion T4 eugenics program that “murdered 9,839 people” as part of the Nazi genocide program to purify Germans racially. She spent only a year in prison for her crimes.

Nurses as murderers

Nurses played a critical role in the Holocaust and the attempt to implement eugenics. Lower writes that the “first Nazi mass murderess was not the concentration camp guard but the nurses. Of all female professions she was the deadliest” (p. 120). The Nazi killings began in the hospitals of the 3rd Reich, then the hospitals of the countries the Nazis conquered. The first killing methods were not the gun or the gas chambers, but the sleeping pill, then the hypodermic needle, and last, starvation. The first victims were children, then old people, then the rest including ‘inferior races’ (p. 120). This was done in the name of eugenics spawned by leaders such as the American, Harvard-educated Charles Davenport. His writings include the book *Eugenics: The science of human improvement by better breeding*. The Nazis thought they were doing just that, and this is why they named their eugenic programs “racial hygiene” (pp. 120–121).

The eugenic movement in America and Nazi Germany believed that inherited ‘genetic’ defects were partly racial, and they deemed some races were “more advanced than others, all of them competing for survival” (p. 121). The Nazis and many others viewed racism as something to be proud of. Germans believed their ideals could be achieved only by removing humanity’s dross, including its inferior races. Nazi men and women must understand and apply ‘the science of inequality’ to achieve their golden greater Germany.

The final solution to the degeneration of the race problem was to destroy the contaminant, namely inferior races. The Nazis believed we are not descendants of one parent, as Judaism and what the Nazis called its bastard child, Christianity, teach, but rather that we evolved, and that some races are more evolved than others. With these ideas firmly implanted

in the minds of the nurses and other women, they could do their part to make Germany a more perfect society. It required an army of thousands of nurses, midwives, doctors, and other medical personnel to get the job done.

In the end, close to 400 medical institutions served as centres of racial screening and selection, cruel experimentation, sterilization, starvation, and poisoning all in working towards achieving this eugenic goal (p. 121). After wiping out most mental patients in German hospitals, the eugenic experts began to do the same in Poland, Ukraine, Belarus, and other hospitals (pp. 121–122).

In the end, well over 200,000 people were murdered, many for what we would regard as minor or treatable maladies. Next came ‘mercy’ deaths of mentally or physically disabled soldiers on the Eastern front to put them ‘out of their misery’. As expected, this adversely affected troop morale, thus was not widely made known and denied in public reports. Some nurses testified that they gave lethal injections to brain-damaged, blinded or mutilated German servicemen (p. 123). It was the job of the educated teachers to help instill these Darwinian racist eugenic goals in the minds of every student, especially health students.

Women as teachers

Teachers often “became cooperative agents of the Nazi Party” (p. 56). The preparation of women for this important role in Nazi Germany “required indoctrination and reinforcement pursued relentlessly in the Reich’s schools. ... a proper education should include burning ‘the racial sense and racial feeling into the instinct and the intellect, the heart and brain of the youth’” (p. 39). For example, students learned in mathematics class the welfare cost to maintain ‘useless eaters’, a

theme interwoven in all subjects to help indoctrinate the students into the superior race belief (p. 39).

The teaching profession stressed instruction in making judgments of who was human and who was 'subhuman' (p. 40). Hundreds of teachers were sent to occupied Poland to teach the children that were deemed to be 'racially valuable', as determined by various tests like those developed by Darwin's cousin Francis Galton (p. 43). Many of these children were orphans because their parents had been shot and, even though traumatized, the teacher's job was to teach them "proper behavior and the superiority of the German race" (pp. 42–43).

Professor Lower details some of the horribly violent female concentration camp guards and brutality that rivalled anything perpetrated by their male counterparts. The long-held picture of German women taking care of the home front during the war as loyal wives and cheerleaders for the Führer, pales in comparison to Lower's incisive case for the massive complicity, and worse, of the 500,000 young German women who became part of the Nazi war machine. Many were placed, for their first exposure, directly in the killing fields of the expanding Reich in the East.

This land was needed to have room for what the Nazis planned would be the rapidly growing population of Aryan children as a result of women being encouraged to reproduce with or without a husband. Women who had four or more children were given a decoration conferred from 1939 until 1945 in three classes: bronze, silver, and gold to mothers who exhibited exemplary motherhood, and who conceived and raised at least four or more children.

The enormous bureaucracy required for the Final Solution

I have read close to 50 books on the Nazi movement, but this one covered

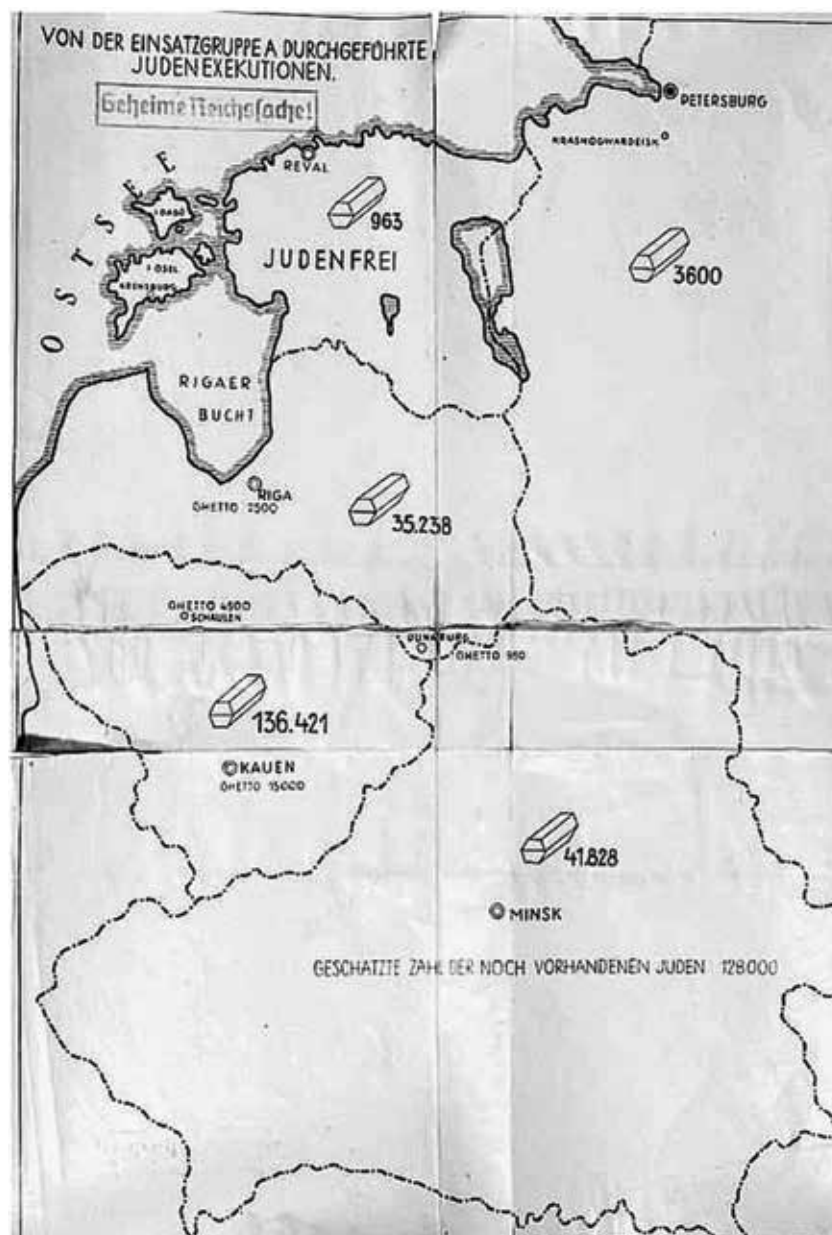


Figure 1. Coffin-decorated tally of Einsatzgruppen killing of *Untermenschen* (subhumans)

an area rarely reviewed in these books: the enormous bureaucracy required by the Nazis to administrate the vast conquered territories in the East and determine the *Untermenschen* (subhumans) to either exploit or murder them. This was covered by Professor Lower in detail because a significant part of the staff were women. Women were secretaries, clerks, and administrators of specific programs.

These women opened the mail and read the letters and other correspondence to determine the appropriate action, either file it away or reroute it to other persons. Photographs were often included of the atrocities committed by the *Einsatzgruppen* (figure 1), the paramilitary death squads of Nazi Germany responsible for mass killings, primarily by shooting, during World War II. The correspondence also

described the number murdered, where, when, and how it was carried out for record keeping. These women would write home to their parents, friends, and relatives, often describing the atrocities in great detail, good evidence that the killings were widely known by the German people and well-documented. Thus, none of the women “could claim ignorance of the human impact of her work” that involved the mass murders (p. 99).

Women became involved in the Nazi war machine for several reasons, including to have a part in building the new Germany, to experience new adventures, to get away from dead-end jobs at home, or to break up boredom. Because a large portion of young men were in the military, finding husbands was not realistic during the war. Those who had boyfriends in the military did not want to waste their time waiting for them to be discharged. In the end, over 20 million German soldiers were killed, leaving many thousands of widows and single women behind. Another reason so many women became part of the Nazi war machine was they “got swept up in the moment and movement” (p. 98).

Much of the violence against *Untermenschen* was well-documented, some in great detail by Lower. For example, a mother who begged for her life so she could take care of her baby (or in some cases her mother). Those so claiming were allowed to bring their baby (or mother) to prove their claim, and both were subsequently shot. Conversely, some of the men experienced great difficulty with being part of the senseless human carnage, and it fell to the female nurses to attempt in some way to help comfort them. The women in this case often appealed to their masculinity and their role in helping to achieve a greater Germany.

The numbers of eugenic murders are numbing. In the first wave of massacres in the Soviet Union alone, over 500,000 were murdered, then another 135,567

in the small neighbouring countries, such as Estonia (p. 107). Lower’s well-documented work also helps one to realize the enormous amount of money, men, women, and resources required in the goal of eliminating the *Untermenschen*. Use of these enormous resources almost appeared to be more important than winning the war, and likely was one major reason why Germany lost the war.

An example of the cruelty by some women is 22-year-old Johanna Altvater. She worked in the Ukraine for the regional commissar, SS officer Wilhelm Westerheide. She often accompanied her boss on shooting parties on weekends to hunt and kill Jews. On September 16, 1942, she entered the Jewish ghetto and saw two children, a 6-year-old and a toddler. She gestured to them as if she was going to give them candy (p. 126). When they came, she lifted the 6-year-old in her arms and held her so tight the child began to scream. Ms Altvater then grabbed the child by the legs and slammed its head against the ghetto wall like one would bang dust out of a rug.

She then threw the now lifeless child at the feet of her father, who testified that he had never seen such inhumane behaviour from a woman. The father added there were no other German officials present. Altvater did this act on her own to help natural selection with removal of the *Untermenschen* to contribute her part to produce a superior race. After the war she finally—almost 40 years later, in 1979—had her day in court with her former superior, Westerheide. They were ultimately acquitted in a lower court and again in a higher court in December 1982. After 40 years it is hard to prove even solid cases. Most witnesses were dead or could not remember certain details. The women, as was true of the men, usually claimed they were only obeying orders. So Altvater, like too many of the other women discussed in the book, as Lower concludes, “got away with murder”.

Conclusion

The major takeaway is that women’s involvement in the Nazi killing machine was because they were fully convinced that this work was “expected of a virtuous woman, a loyal German patriot, a racially superior Aryan” (p. 79). It was also a result of the indoctrination in the schools, colleges, by the mass media, the Nazi-sponsored boys’ and girls’ organizations such as the Hitler Youth movement, radio broadcasts, the movies, and other propaganda. The same is true of Darwinism today. It is accepted by much of the Western population for many of the same reasons, as well as the censorship of opposing views.^{2,3,4}

The Nazis rejected the view that all humans are brothers and sisters, all descended from Adam and Eve, and instead accepted the opposite view, namely that some races were not only inferior, but subhumans called the *Untermenschen*. This was the term the Nazis used to describe non-Aryan “inferior people”, often referred to as “the masses from the East” that included Jews, Roma, and Slavs, mainly ethnic Poles, Serbs, and Russians. The result of rejecting Adam and Eve as our first parents has proved devastating.

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Ubiquity of convergence— are evolutionary outcomes inevitable?

***Improbable Destinies:
Fate, chance, and the future
of evolution***

Jonathan B. Losos

Riverhead Books, New York, 2017

John Woodmorappe

Author Jonathan Losos is Biology Professor and Director of the Losos Laboratory, at Harvard University. He is Curator of Herpetology at Harvard's Museum of Comparative Zoology and he specializes in field experiments on lizards.

This book is a boon for naturalists. It is packed with countless details about plants, invertebrates, and vertebrates. Evolutionary thinking is generally a speculative add-on or afterthought.

This book also describes field experiments on evolution—which really are experiments in variation within the created kind. These enable the creationist scientist to better understand how creatures can rapidly adapt to novel environments, such as must have happened after the Noachian Deluge. For example, one experiment showed that fish can adapt to a 4.5° tolerance to colder waters in only two years (p. 200)!

Modes of convergent evolution

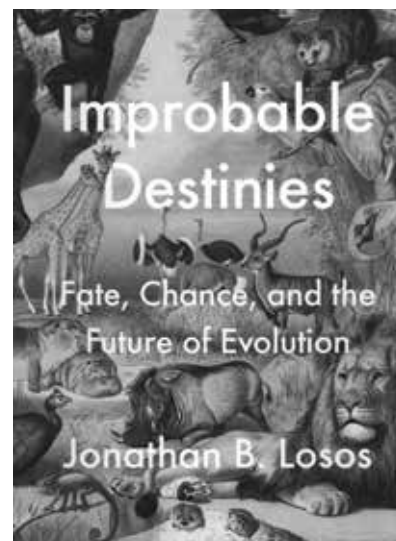
The author believes that convergent evolution is much more common than is usually realized. He discusses many examples and modes of convergence. Permit a few examples.

There are many convincing lookalikes among entire vertebrate animals. As an example, he discusses what happened when Europeans came to Australia. They easily recognized the familiar wrens, warblers, babblers, flycatchers, robins, nuthatches, etc. Many knowledgeable ornithologists made the same deductions. However, genetic studies later showed that the Australian birds are more closely related to each other than they are to their presumed respective European counterparts. In other words, according to evolutionary thinking, the amazing similarities between the Australian avifauna and the European avifauna are the products of convergent evolution.

Of course, convergence does not require an evolutionary explanation. Everyday intelligent-design explanations suffice. For instance, the gasoline-powered lawnmower, though anatomically related to the automobile, is strongly convergent with the battery-powered lawnmower.

Convergence can occur between the most unexpected animals. For instance, Losos, a lizard specialist, claims that a certain African lizard has a placenta-like structure (p. 345).

Convergence can also occur in terms of modular units situated in the bodies of organisms. Consider us humans. We have the bipedality of the theropod dinosaurs, kangaroos, and hopping rodents. We also have reduced hair, as is the case with hippos, pigs, elephants, and the naked mole rat. Our opposable thumbs are found not only in our closely related primates, but also in opossums, koalas, some rodents, and some tree frogs. Finally, our large, forward-facing, binocular



eyes occur not only in all primates, but also in many cats, owls, and Asian whip snakes.

Finally, convergence can occur in mosaic fashion. This is so pronounced in the platypus that, when this oddball was first described, it was at first suspected of being a hoax—a made-up animal consisting of an assortment of cut-up parts of various animals (figure 1). Thus, the very-real platypus has the bill of a duck, the webbed feet of an otter, the stout tail of a beaver, the hollow-tubed venom-injecting spine of the rattlesnake tooth, and electroreception capabilities reminiscent of that of the electric eel.

Why was there convergent evolution?

When traits are convergent, especially repeatedly, and in organisms that live under very similar environmental conditions, this is taken as an indicator that natural selection drove the traits to converge. For instance, the fusiform shape of the fish and the dolphin, which are not close evolutionary relatives of each other, is understood in terms of the fact that it is about the only geometry that a body can have that enables it to move effectively in water. Such thinking intuitively makes sense, but



Figure 1. The platypus is an oddball consisting of convergent modular units.

eschews special creation (and common design) as alternative explanations. For instance, the fusiform shape of the aeroplane and the race car exist in order to reduce the drag of air at high speeds, but no one imagines that they are the outcomes of a blind evolutionary process. They are the products of intelligent design.

In many cases, evolutionists must fall back on speculation and adaptationist just-so stories to try to explain why convergent features exist. For instance, many theropod dinosaurs are believed to independently have acquired small forelimbs. The famous *Tyrannosaurus rex* has them, and so does the recently discovered *Gaucha shiniyae*. Losos comments:

“Scientists have put forward all manner of explanation, one crazier than the next. Maybe the super-predator fed in such a frenzy that its arms evolved to be short so it wouldn’t accidentally bite them off and feed them. Perhaps the little limbs were used for pushing off the ground to get up after a nap. Possibly, male *T. rex* needed shorter arms to better titillate their mates. Needless to say, none of these ideas has gained support” (p. 100).

Then Losos goes further, warning against adopting *any* adaptationist explanation:

“Convergent evolution doesn’t necessarily prove that a shared trait

is the result of natural selection. Maybe *T. rex* and *G. shiniyae* both just happened to evolve diminutive forelimbs by chance. If we knew why small limbs with two digits evolved, what advantage they provided, or why natural selection favored them, we would have reason to think that the convergence was adaptive. But absent any data, we can’t just assume that natural selection is the cause” (p. 101).

Singularities in nature

The singularity, in a sense, is the opposite of convergence. It is a one-of-a-kind organism. This includes the human, which has no animal counterpart remotely close in intelligence and capabilities. The elephant—with its versatile, specialized nose (the trunk), capable of a diversity of tasks—is another singularity. As another example, the archerfish alone has the capability of directing a shooting stream of water to knock an insect off a plant and into the water.

Are evolutionary outcomes inevitable?

Evolutionists have often speculated on how things would be the same, or different, if evolution was to repeat itself. Were the Cambrian explosion to

rerun, would human-like creatures still emerge? Or would we have a world of bizarre, land-dwelling octopuses?

Author Losos takes such speculations to a more sophisticated level. For instance, he focuses on New Zealand, which had no land mammals except bats. Instead, its distinctive flightless birds, such as the kiwi and moa, superficially filled some of the niches taken by mammals elsewhere. From this, he suggests that, had the mammals gone extinct at the end of the Cretaceous along with the dinosaurs, our world would be characterized by a variety of flightless birds.

As for the question of human reappearance, he charts the course of primate evolution. In Madagascar, the lemurs underwent a distinctive adaptive radiation, but nothing emerged that remotely resembled a lemur counterpart to the human. Another distinctive primate adaptive radiation—in South America—consisting of various monkeys and marmosets, also failed to produce anything even suggestively humanesque. From this, Losos concludes that humans were likely the result of evolutionary contingencies (that is, chance events that radically shaped subsequent evolutionary outcomes (p. 302)). For this reason, it is very unlikely that humans would ‘repeat’ under any ‘replay’ of organic evolution.

Is evolution science?

In the past, creationists (for example, the immortal Duane T. Gish) had suggested that molecules-to-man evolution, strictly speaking, is not science, as it deals with past, non-observable events, and is not something that can be experimentally tested in the laboratory. Other creationists did affirm that evolutionary theory can qualify as science, but had made a distinction between what they called operational science (e.g. the

effects of exercise on heart muscle) and what they called historical science (e.g. the inferred course of organic evolution).

Interestingly, Losos' concept of evolution, as a science, resembles that of many creationists. He comments:

"Evolutionary biology is a particular challenge to philosophers of science. It does not fit the standard notion of how science works—itself a caricature—in which a crucial experiment decisively settles the question. Rather, evolutionary biology involves history, figuring out what happened in the past, asking questions not amenable to the experimental method (what experiment can explain the evolution of a giraffe?). I've already discussed how studying evolution can be similar to a detective story, a whodunit whose methods share as much with the study of history as they do with other sciences" (p. 265).

In other words, evolutionary theory is a form of deductive reasoning that *presupposes* the existence of organic evolution at least as much as it 'shows' that evolution happened.

Limitations of field experiments

As noted earlier, the author specializes in field experiments involving (supposed) evolutionary change. These, of course, deal with minor changes in living organisms, and, by themselves, have nothing to do with presumed molecules-to-man evolution.

Even so, Losos is refreshingly candid about the limitations of biological field experimentation:

"But field experiments have one big disadvantage—you can't control for everything. Nature is varied, even over short distances. And those differences can confound the interpretation of results. That's why laboratory scientists shudder at the thought of doing experiments in

the field—the lack of control gives them the willies. If you really want to know how repeatable evolution is, how much the same selective environment will predictably yield the same evolutionary outcome, then conduct your experiment in the lab, where the environment can be precisely controlled" (p. 216).

However, such lab experiments are no panacea either, as described next.

Did experimental *E. coli* bacteria really acquire an evolutionary novelty?

Experiments involving mutations in *E. coli* and other bacteria have been going on for decades. This is part of a research effort that is called LTEE (long-term evolution experiment).

"As you will recall, *E. coli* naturally can capture citrate in the absence of oxygen by turning on the *citT* gene, which causes the cell to produce transporter proteins that poke out of the cell's membrane and latch on to nearby citrate molecules. What happened in the Cit+ *E. coli* cells is that a duplicate copy of the gene was made Normally, the *citT* gene, which produces the citrate-snagging transporter protein, is activated when oxygen levels are low. In contrast, *rnk*, a gene that occurs close to *citT* on the chromosome, turns on when oxygen levels are high, rather than low. Just by chance, when the second copy of the *CitT* gene was accidentally created, it ended up being placed right next to the activation switch for the *rnk* gene. This rewired the *citT* copy to be turned on along with *rnk* in the presence of oxygen. This happenstance of molecular miscopying in the DNA replication process gave Cit+ *E. coli* the ability to ingest citrate in the presence of oxygen" (p. 257).

Losos points out that it took over 33,000 generations to get to this point.

Moreover, the aerobic metabolism of citrate had failed to appear in every single one of the other lineages, despite apparently identical experimental conditions. The author suggests that the one time it appeared owed to a very unlikely series of coincidences. A gene duplication had to take place and then the gene copy had to land near the promoter of the other gene. This is what permitted the upstart duplicated-gene to express itself under aerobic conditions. In addition, one of more potentiating mutations had first to occur in the lineage—and in a manner unrelated to the eventual aerobic citrate metabolism—owing to the fact that evolution lacks foresight.

The results are very exciting to Losos, and he makes these overstatements: "The conclusion is clear: a set of mutations, occurring in just the right order, can have a major impact, sending evolution down a different, unrepeated path" (p. 259). So many thousands of generations of lab bacterial evolution, and so much hype over such trivially unique results! The bacteria could always metabolize citrate in the absence of oxygen and—lo and behold—the bacteria can now metabolize citrate in the presence of oxygen. Big deal.

This is hardly a manifestation of evolutionary novelty: it is merely the relocation of a pre-existing capability. Nothing else is different. By way of analogy, imagine a building that relies on a photic system to distinguish between daylight and night, in order to automatically switch on interior lights at dusk and turn off the building heating, and then switch off the interior lights at dawn and turn on the building heating. Everything works on schedule. Then, an earthquake occurs, and the wires get short-circuited. The lights and/or heating now come on and off at various times not necessarily in synchrony with the diurnal cycle. The light uselessly comes on in broad daylight. What is novel? Absolutely

nothing. What's more, this turn of events does not even begin to answer this fundamental question: How did the photically driven lighting and heating system originate, presumably without a designer, in the first place? The same questions can be asked about the citrate-metabolizing system in *E. coli*. How did it originate? And how did bacteria originate?

Protective colouration in many organisms—no evolutionary novelty

Unfortunately, not everything in this book shows exemplary reasoning. I examine some of this in the remainder of my review.

Losos thus generalizes on the subject of protective colouration:

“All around the world, small animals have evolved to match their background, all the better to avoid being detected by their predators. On old lava flows, lizards, mice, grasshoppers, and other animals have evolved to be much darker than they are elsewhere. Conversely, on light-colored soil, animals evolve a pale complexion to blend in with the sandy substrate” (p. 203).

The author defends the validity of Kettlewell's experiments on the peppered moths, and claims that other scientists have confirmed his findings. He also ‘spans’ creationists for questioning Kettlewell and, in doing so, he misses the whole point. If Kettlewell is wrong, then it is just ‘icing on the cake’ in terms of the iconic status of the peppered moths. But if Kettlewell is correct, in no sense is evolution proved right, and in no sense are creationists wrong. The moths are still moths. Referring to the paragraph above, dark lizards are still lizards, dark mice are still mice, etc. Nothing novel, much less molecules-to-man evolution, has been shown, much less proved, by the fact of protective colouration.

That old saw—again—about the poorly designed vertebrate eye

In conventional evolspeak, the ‘backwards’ retina is supposed to show that evolution lacks foresight, and can only modify what had existed before, and then in jury-rigged fashion. So, according to this chain of evolutionary reasoning, it is a minimum-solution system. Author Losos thoughtlessly parrots the ‘backwards’ retina argument, and how it is supposed to demonstrate the absence of an intelligent designer.

However, Wells,¹ shows that the octopus eye, despite its ‘proper’ deployment of retina and blood vessels, is actually inferior in function (visual acuity) to that of the vertebrate eye. In addition, on close examination, it turns out that the ‘properly’ wired retina is far from optimal even for the bare function of a vertebrate eye. That is, were the high resolution demanded of the vertebrate eye to be expressed in terms of a design utilizing a “properly”-wired retina, the vertebrate eye would have to be impossibly large.

Therefore, far from being ‘bad design’ or something ‘jury-rigged’, the ‘backwards’ vertebrate retina is actually an intelligent, space-saving engineered structure that is necessary for the high resolution of the vertebrate eye at a reasonable size. Losos is completely oblivious to these facts.

There is more. Evolutionist Nick Lane parts ways with most evolutionists, regarding the ‘bad design’ of the eye. In fact, he turns it around, elaborating on the advantages of the ‘backwards’ human retina:

“The wires are colourless, and so don't hinder the passage of light much; and insofar as they do, they may even act as a ‘waveguide’, directing light vertically on to the light-sensitive cells, making the best use of available photons. And probably more importantly, we have the advantage that our own light-sensitive cells are embedded directly in their support cells (the

retinal pigment epithelium) with an excellent blood supply immediately underneath. Such an arrangement supports the continuous turnover of photosensitive pigments. The human retina consumes even more oxygen than the brain, per gram, making it the most energetic organ in the body, so this arrangement is extremely valuable. In all probability the octopus eye could not sustain such a high metabolic rate. But perhaps it does not need to. Living underwater, with lower light intensity, the octopus may not need to re-cycle its pigments so quickly” (p. 175).²

Conclusion

This book is packed with interesting, even fascinating, details about living things. It is undoubtedly a fine book for those interested in the natural world. Many thought-provoking examples of convergence are provided.

However, none of this is evidence for evolution. In fact, the book has relatively little to say about evolution itself, as it usually simply *assumes* evolution and then interprets everything through that mental box.

Book after book after book repeats the hoary and discredited ‘bad design’ argument about the vertebrate retina, and this one is no exception. It is so predictable that it is getting a little tedious to see. However, this ubiquity speaks volumes about the intellectual poverty and shallowness of much contemporary evolutionistic thinking.

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Extensive mixing among Israelites and non-Israelites in biblical history

I am deeply concerned about a statement in Dr Robert W. Carter's article from *J. Creation* 31(3), entitled "Extensive mixing among Israelites and non-Israelites in biblical history". In it he wrote: "Just as there is no clear Jewish bloodline, given the numerous genealogical data presented in the Bible, there is also no clear 'Jewish' DNA." If there are no clear Jewish bloodlines in the Bible, how do we know that Jesus is a descendant of David? How do we know that the 144,000 witnesses of the Tribulation are descendants of Jacob, particularly descendants of his sons by tribe? How have Jewish descendants of Levi been found in Ethiopia? There has to be some connection that is traceable. I don't deny the mixing (that is obvious), but God would be a liar if Jesus

wasn't a descendant of David, or if these witnesses weren't descendants of specific tribes. I firmly believe in the Bible's statements, but I'm not a geneticist. Isn't there some way to trace ancestry?

James Denning
Caledonia, MS
UNITED STATES of AMERICA

» Robert Carter replies:

James was 'deeply troubled' by my take-home point. This means the point was clear, but it also means there were unanswered implications. Please note that I published a follow-up article in the subsequent *Journal* issue.¹

How do we know Jesus is a descendant of David?

We have two separate genealogies in the Bible (Matthew 1 and Luke 3) that claim such. There may be adoptive relationships involved, but within the Davidic line.² Either way, Jesus was a descendant of David.

But genealogy is strange. With the exception of the mtDNA and Y chromosome, a person's DNA gets split into smaller and smaller bits

over time. Eventually, nothing is left. If you go back in your family tree about 5 generations, you will run into 'ancestors' from whom you inherited no DNA. If you go back 10 generations, the majority of your ancestors are ancestors in name only (figure 1).

How do we know that the 144,000 witnesses of the Tribulation are descendants of Jacob?

I do not wish to get into eschatology. But, assuming this refers to 144,000 literal people, this can still be true both genetically and genealogically. Jewish people inherit DNA from their Jewish forebears. Thus, the 144,000 would be descendants of Jacob, both genealogically and genetically. The fact remains, however, that both Jacob and his descendants are products of mixed descent from a 'Middle Eastern' genetic background.^{1,6}

It is a little more difficult to divide them by tribe, because there was much tribal intermingling during Israel's history. For example: Mary, from Judah (Luke 1:32, by association), was related to Elizabeth, who was "of the daughters of Aaron" and whose husband was a Levitical priest (Luke 1:5). Hezron, of Judah, married the daughter of Machir, of Manasseh (Genesis 46:12; Genesis 50:23; 1 Chronicles 2:21). And Aaron, of Levi, married Elisheba, of Judah (Exodus 6:16–20, 23; Numbers 1:7). Which tribe do these people come from? It cannot be purely on paternal/Y chromosome lineage because of tribal mixing. Also, many non-Jewish males and non-Jewish females were incorporated into Israel over time.¹ Many similar but unrecorded events may have occurred.

Have Jewish descendants of Levi been found in Ethiopia?

Most of the information available online about the Ethiopian Jews is incorrect. Please allow me to use another similar case instead: the Lemba of SE Africa.

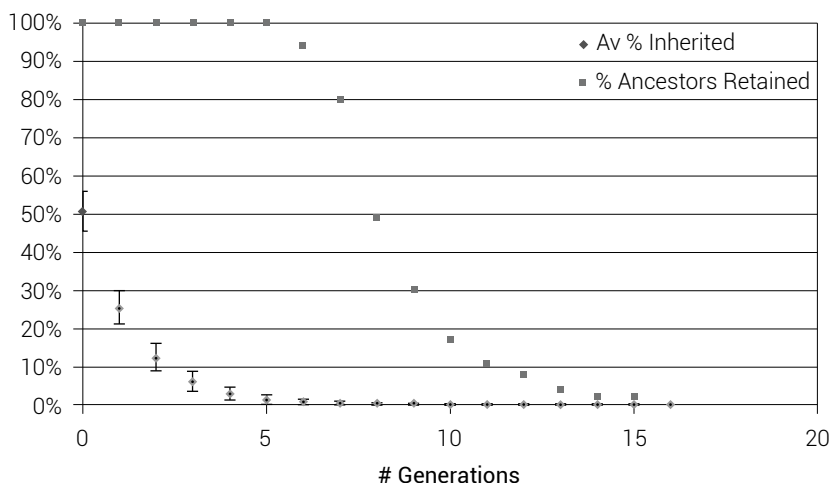


Figure 1. If you trace your family tree back in time, the number of genealogical ancestors increases exponentially. But the percent of their individual DNA contribution to your genome goes down exponentially. Here, I model a human-like genome with one recombination event per chromosome arm per generation. Since the position of recombination is random, there is a small degree of variability in the amount of inherited material (error bars). Once the size of the surviving fragments drops below the average size of the recombination blocks, entire sections of ancestral DNA are lost. Model results are similar to the results reported by Rohde *et al.*^{3,4} and Jagadeesan *et al.*⁵

They claim descent from Jewish mariners, even though they live thousands of miles from Israel. Their genetic background, including the mtDNA lineages, is strongly Bantu, but they have a high rate of ‘Middle Eastern’-looking Y chromosomes.^{7,8} This is strong circumstantial evidence that their claimed history is real.

A few of those men carry the Cohen Modal Haplotype (CMH). This Y chromosome type is associated with Jewish men who claim to be Levites. But the CMH is also found among non-Jews. Thus, a strong signal exists among the claimed descendants of Aaron, even though the ‘signal’ can be found outside the group.

Why is the CMH not restricted to one family? First, just because Aaron carried one particular Y chromosome, it does not preclude other men from his extended family carrying it as well. Second, genes tend to diffuse out of one population and into others. Thus, there is a chance that their ancestors were not Jewish. It could have been a group from the Arabian Peninsula, a few of whom also had para-Aaronic ancestry. But combining the oral history with the mitochondrial and Y-chromosome evidence makes a pretty strong case for what I reported earlier:¹ the Lemba are partly Jewish.

There has to be some connection that is traceable

Traceable by whom? God or man? I certainly could not do it.

Is there some way to trace ancestry?

We can trace ancestry back in time until historical recombination cuts an individual’s genome into very small pieces. After that, everything is statistics. In the end most people leave behind no genetic trace.

Everyone on earth shares the same ancestral pool. It is worth quoting Rohde *et al.* at length here:

“... no matter the languages we speak or the colour of our skin, we

share ancestors who planted rice on the banks of the Yangtze, who first domesticated horses on the steppes of the Ukraine, who hunted giant sloths in the forests of North and South America, and who laboured to build the Great Pyramid of Khufu.”³

The genomes of all people on Earth are the result of thousands of years of shuffling among the many small sections of DNA. And it is almost impossible to *not* have DNA from outside of your immediate ancestral group. This is definitely true of the Jewish people, who started off as a mixture of different people, who mixed extensively with their neighbours throughout biblical history, and who have continued to mix with outsiders ever since.

Thus, there is no such thing as ‘Jewish’ DNA. They come from a Middle Eastern melting pot. This makes some people uncomfortable, but these are the facts we must consider as we struggle to interpret various biblical passages.

Robert W. Carter
CMI UNITED STATES OF
AMERICA

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Was Terah dead when Abram left Haran?

While reading Andrew Sibley’s summary of the attempts to reconcile Abram’s moving before Terah’s death, it seems the one verse, the key verse never spelled out, is a statement from Abraham himself in Genesis 23:4, “I am a foreigner and visitor among you”, which further shows that Augustine is correct: Abraham did not officially consider himself (nor did the locals consider him) a resident until he bought and *paid* for a piece of land, which is why Abraham insisted on paying for it and not accepting it as a gift.

Abraham was both publicly stating his desire to become a resident of Canaan after Terah’s death and officially asking for such residency status.

Chuck Roehrich
Grand Island, NB
UNITED STATES of AMERICA

» Andrew Sibley replies:

In response to Chuck Roehrich’s strong support for Augustine’s position, relating to Abraham and Terah’s life, I would suggest there are some difficult issues that need to be resolved. I consider it to be a possible solution, but not the preferred one at this stage. As well as the problem of Terah’s death in relation to Abram/Abraham’s life there are further questions that arise (from Acts 7:15–16) as to when Abraham purchased land in Canaan, and where.

“And Jacob went down into Egypt, and he died, he and our fathers, and they were carried back to Shechem and laid in the tomb that Abraham had bought for a sum of silver from

the sons of Hamor in Shechem” (Acts 7:15–16, ESV).

There is insufficient space to deal with this question fully in a letter, and there are many angles to consider, but it might be seen from these verses that Abraham had purchased other land in Canaan (this was alluded to in my endnote 26). Abraham is recorded as wandering through Shechem in Genesis 12:6–7, at which point God speaks to him and promises the land to his descendants. Abraham builds an altar.

“Abram passed through the land to the place at Shechem, to the oak of Moreh. At that time the Canaanites were in the land. Then the Lord appeared to Abram and said, ‘To your offspring I will give this land.’ So he built there an altar to the LORD, who had appeared to him” (Genesis 12:6–7).

This might suggest an *earlier* purchase of land, understood through other sources, but not recorded in the Masoretic Text of Genesis.

Secondly, one might argue that there are several places in Genesis where Abraham asserts his right to the natural resources of the land. For instance, Abimelech allows Abraham to wander across his land, and they even make a joint oath at Beersheba with an exchange of sheep and cattle. Genesis 20:15: “And Abimelech said, ‘Behold, my land is before you; dwell where it pleases you’”; and Genesis 21:31–32: “Therefore that place was called Beersheba, because there both of them swore an oath. So they made a covenant at Beersheba.” And yet Abimelech does not seem to give up his right to the land; we are only told that that Abraham has rights to take water from the ground. These events occur prior to the purchase of land from Ephron the Hittite to bury Sarah. Interestingly, the text of Genesis 22:19–24 informs us that Abraham lived at Beersheba, and then hears news of Nahor’s family, but no news of Terah, who might be presumed to be long dead.

But thirdly, the text seems to be telling us that Abraham was throughout his life a sojourner, with the land promised to his descendants. This is stated in Acts 7:5, and also in Hebrews 11:9–13:

“By faith [Abram] went to live in the land of promise, as in a foreign land, living in tents with Isaac and Jacob, heirs with him of the same promise. For he was looking forward to the city that has foundations, whose designer and builder is God. ... These all died in faith, not having received the things promised, but having seen them and greeted them from afar, and having acknowledged that they were strangers and exiles on the earth” (Hebrews 11:9, 10, 13).

Taken together, this suggests that the purchase of land from Ephron the Hittite may not be sufficient to claim settlement in the land. Abraham may have purchased land prior to this, and he was making covenants with the existing land owners, but Scripture seems to suggest he did not properly settle in the land. These are questions for further consideration.

Andrew Sibley
Seaton, Devon
UNITED KINGDOM

Swinging too far to the other side

I would like to make a few comments on Michael J. Oard’s review of Rodney Stark’s book *Bearing False Witness: Debunking centuries of anti-Catholic history*.¹ While the paper was well-written with good intent, it goes too far and comes across as a sort of unwarranted apologetic for the Roman Catholic Church. The author correctly dispels myths about certain forms of anti-Semitism, anti-scientism, and the Crusades, yet portrays the Dark Ages in a one-sided manner, or even downright perpetrates myths about the Inquisition itself. While it is incorrect to glibly believe everything that secularists say about the Roman Catholic Church, still we must remember that the Roman Catholic Church is made up of fallen people, who are sensitive about upholding a positive image of their church.

Regarding the Dark Ages, this was an era of the gradual accumulation of different heresies in the Roman Catholic Church. Such heresies would have obviously affected the morals of society. Thus, the Reformation would have led to revival, since it freed people from the practical consequences of false teachings. This was a time when the papacy was very unstable, and under the control of rival aristocratic factions. Popes reigned for short periods of time, some for even just months or days. Popes murdered each other, and bought and sold ecclesiastical offices for money, and public illiteracy and immorality were high.² It is not too much of a stretch to suppose that the Roman Catholic Church had devolved into immorality during this period, just as Israel had done during the time of the prophet Elijah.

It may be true that capitalism first appeared in Roman Catholic monasteries in the ninth century, as Oard’s book review states. However,



Figure 1. Medal struck by Pope Gregory XIII to commemorate the massacre of the French Huguenots on St Bartholomew's Day in 1572. The inscription reads "VGONOTTORVM STRAGES 1572" (Massacre of the Huguenots, 1572).

as opposed to this, the present pope, Francis I, is also quite well known for his socialistic ideology, including social justice.

As to the number of people killed in the Inquisition, the author states that "the total amount of executions over the few hundred years of the Inquisition in all of Europe was less than 3,000!" There was no reference to verify this statement in Oard's article, but even a cursory calculation can disprove this conjecture. By some accounts, the Inquisition was *officially* held to have lasted from 1203 until 1834, a period of 631 years. If only 3,000 people were killed during the Inquisition, this equates to *a mere five people killed per year*. Such a small number hardly requires an entire ecclesiastic judicial apparatus to search for and root out heresy. In *Summa Theologica* (available online), Thomas Aquinas writes:

"With regard to heretics two points must be observed: one, on their own side; the other, on the side of the Church. On their own side there is the sin, whereby *they deserve not only to be separated from the Church by excommunication, but also to be severed from the world by death* [emphasis added]."³

The number of people killed during the Inquisition could well be

even greater than what we expect. This is because many records from the Inquisition may have been destroyed since the Middle Ages. This number is likely in the millions,⁴ since a similar number of Jews were killed in the Holocaust in less than ten years. If we unduly deflate the number of people killed during the Inquisition, we would be dishonouring these victims by denying their having been murdered by Rome.

The Roman Catholic Church would obviously try to play down the number of people killed during the Inquisition. It might be argued that the church itself did not persecute heretics, only the state did. This argument is faulty in that during the Middle Ages the popes held both ecclesiastical and temporal power. According to Pope Boniface VIII's bull, *Unam Sanctam*, where he explains his theory of the two swords, the church has both ecclesiastical as well as temporal power.⁵ In this manner popes put whole countries, such as England, under interdict, and humiliated Henry IV, Holy Roman Emperor at Canossa in the year 1077.²

According to some historians, people such as the Waldenses and the Bogumils were held to be heretical groups by the Roman Catholic Church prior to the official beginning of the Inquisition. Even Roman Catholic sources readily acknowledge that up to 10,000 French Huguenots were murdered during the St Bartholomew's Day massacre on 23–24 August 1572, and the following days in Paris and other parts of France.^{2,6} Figure 1 depicts a medal struck by pope Gregory XIII after the massacre commemorating this horrible act.

In summary, while it is wrong to falsely accuse someone out of malicious intent, defending the same party must also be done in an accurate manner.

Matthew Cserhati
San Antonio, TX
UNITED STATES of AMERICA

» Michael Oard replies:

Matthew Cserhati brings up some valid points, and I certainly agree with his last sentence, that we need to be accurate. I must first say that neither Rodney Stark nor myself are Roman Catholics. Second, we both are well aware of the historic problems within the Catholic Church. I believe Dr Stark wrote this book because he was interested in the truth, which is also the reason I wrote the book review. I am just the messenger, Cserhati's issue is with Stark. Stark has written other books that are strongly critical of some aspects of the Catholic Church. He has a record of doing dispassionate, unbiased historical research and did so for thirty years at the University of Washington, where he also taught.

Stark points out that early in his career he had believed what the popular culture said about the Catholic Church. He only discovered all the misinformation in the culture by accident in his historical research on various aspects of historical Christianity (he has written many books and research articles on this topic). I will add that Stark often goes to original records for his information, or to historians that use original records, unlike many scholars today. I will now address some of the objections made by Cserhati's.

Cserhati's makes the claim that the 'Dark Ages' were really dark, and in many ways that is true, such as the politics and corruption within the Catholic Church and the governments in general. My one-sided manner was simply reporting what Stark discovered that counters the one-sided belief of the culture. The Dark Ages were so named by the purveyors of the Enlightenment and were inspired by their bias against Christianity. Since the Catholic Church was the only expression of Christianity to have a public presence at the time, the propaganda is directed against the Catholic Church. The point Stark makes is that culturally the Middle

Ages were not dark. Stark documents his contention with a wealth of data. Of course, it was not a golden age. In regard to heresies, the Middle Ages were not much different from any other age. Heresies began soon after Jesus' ascension, which was recorded in the New Testament and early Church history. Heresies have always existed, as they do even to this day.

Capitalism was first introduced by Catholic monks during the Dark Ages. Pope Francis's lean toward socialism does not change this fact.

Probably the main point of disagreement with Cserhati is the number of people killed by the Inquisition. He thinks it likely millions were killed during the inquisition, agreeing with many in the culture, both layman and scholars alike. Recently translated original sources, however, have laid that to rest.

The term inquisition can have many meanings, but the formal Inquisition was an ecclesiastical court of the Catholic Church established by the pope to root out heresy. Its goal was to correct and teach Catholics and their converts. It strayed from this goal at times when its power was used to forcibly coerce people and also to steal land. Among the atrocities were the 'informal inquisitions' against the Cathars and Waldensians, starting in France in the middle of the 1200s. There were others which poorly related to the Inquisition, such as witch hunts, which were mainly caused by secular hysteria.⁷ My review focused on what is considered the worst of the Inquisitions, the Spanish Inquisition. It is the one about which Stark goes into depth in his book.

In regard to this Inquisition, I also was surprised by the low number of deaths. I had heard the low numbers before, but did not believe them until Stark supported them with evidence. Anti-Catholics through the centuries have used the Inquisition to accuse the Catholic Church of maleficence by declaring that huge numbers of people

(even millions) were killed during it. The general population believes this is true. Stark, in his search for truth, starts his analysis of the Spanish Inquisition by stating what he discovered after careful study:

"The standard account of the Spanish Inquisition is mostly a pack of lies, invented and spread by English and Dutch propagandists in the sixteenth century during their wars with Spain and repeated ever after by the malicious or misled historians ... Astonishing as it may seem, the new historians of the Inquisition have revealed that, in contrast with the secular courts all across Europe, the Spanish Inquisition was a consistent force for justice, restraint, due process, and enlightenment."⁸

Stark has used sources that have examined recently revealed archives on the Spanish Inquisition between 1540 and 1700:

"Subsequently, they [historians Carlo Ginzburg, Henry Kaman, E. William Monter, and John Tedeschi] have read the careful records made of each of the 44,674 cases heard by these two [Argon and Castile] Inquisitions between 1540 and 1700. At the time they were written, these records were secret so there was no reason for the clerks to have misrepresented the actual proceedings. In addition, these historians have done an immense amount of more traditional research, pouring over diaries, letters, decrees, and other old documents. The results are solidly undeniable."⁹

Interestingly, of these 44,674 cases, only 826 people were executed.

The Spanish Inquisition was implemented in 1478 by the Spanish monarchs Ferdinand and Isabella. Before 1540 records were poor, but the historians that have examined the period closely agree that this was the most bloody period, with as many as fifteen hundred people executed.⁹ This brings the total to 2,336 people killed

by the Spanish Inquisition between 1478 and 1700. I did err in my review when I said there were less than 3,000 Inquisition deaths in all of Europe, a figure for only Spain.

Looking online at inquisitions in other countries reveals that fairly good records were kept of the Portuguese Inquisition in which, between 1536 and 1794, 1,183 people (3.76% of those brought before the courts) were executed.¹⁰ The Roman Inquisition is probably the only other significant inquisition. It began in 1542 and lasted into the mid-1700s. Of 51,000 to 75,000 cases, 1,250 people were executed.¹¹ So, the number executed during the formal Inquisitions is in the thousands and not millions.

Michael J. Oard
Bozeman, MT
UNITED STATES of AMERICA

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The probability of God: a response to Dawkins

Nick Kastelein

The use of probability in defence of atheism, specifically in Richard Dawkins' book *The God Delusion*, is analyzed. A definition of probability consisting of five parts is used to review the key probability claims made by Dawkins, which relate to the existence of the universe, the origin of God, the possibility of a multiverse, fine-tuning, and the anthropic principle. The concept of God as first cause is defended as a rational proposition that was insufficiently addressed by Dawkins, but provides a logical defence against his core argument. The fine-tuning argument is a teleological argument underpinned by a correct use of probability. This argument demonstrates that a God who is first cause is a more probable explanation for the origin of the observed universe than the naturalist's appeal to mindless processes.

'Probability' is a useful concept, frequently used by scientists and mathematicians. However, probability can be easily misunderstood or misused, a significant risk in the debates over atheism and evolution.

At face value, probability presents significant difficulties for atheists, since they need to believe that everything is the net result of unguided, mindless, random processes. It is difficult to get such processes to account for the fine-tuning of the laws of nature, or the complexity of life, and indeed for many steps in their proposed narrative of origins that are very unlikely and/or currently unexplained. However, in his famous book *The God Delusion* (figure 1), in a chapter titled "Why there almost certainly is no god", Richard Dawkins uses probability as the principal vehicle for his counter-argument: If our universe is improbable, then a supernatural creator capable of making it must be even more improbable, as a consequence of that creator being necessarily more complex. (Of course, we aren't ultimately concerned with whose narrative is *more probable*, but rather which narrative is *true*.)

This article discusses probability in relation to the existence of the universe and its creator and hopefully shows that Christians don't believe in such a very improbable story after all.

What is probability?

In any given context, a good understanding of what is meant by the 'probability' of something can be achieved by identifying the following five components:

1. *Causation*. In all instances when probability is invoked, there is a cause and an effect. For example, if I throw a dice, there is a cause—me throwing the dice—and an effect—the dice landing on a flat surface with one side facing up. Between these there is a chain of causality, facilitated by the laws of physics, taking the dice moment by moment from its initial condition in my hand to its destination on the floor.

2. *Ignorance*. The second part of probability is ignorance. In the case of throwing a dice, I don't know what side of the dice will be facing upwards once it stops rolling.
3. *Knowledge*. The third part of probability is knowledge. In the example of the dice, I know many things. Primarily I know that A) there are six possible outcomes, and B) the dice is entirely symmetrical such that any one of the sides has no geometrical 'advantage' over another.
4. *Proposition*. Where there is ignorance, probability applies to a 'proposed' scenario. For example, I can propose that after throwing the dice, it may land with the three facing upwards. In this context, I can use my knowledge to say that there is a one in six likelihood of the dice landing on a three—this is the probability of my proposed outcome.¹
5. *Direction*. There are two directions to the use of probability. In the above example of throwing a dice, I have knowledge of the cause, but ignorance of the effect—which is here called *forward probability*. In other examples, such as forensic science or medical diagnosis, one may have knowledge of the effect and ignorance of the cause—here this will be called *backward probability*. For example, if I come home to find my television missing, I know the effect and can start assessing the probable cause. A probable cause is that it was stolen; a very improbable cause is that my dog buried it in the back yard.

So what is probability? When you don't know what has happened, or what will happen, probability is a method for *quantifying* what you *do know* (figure 2).

This leads to an interesting insight: probability is not fixed! It is dependent on the boundary between ignorance and knowledge, and this boundary can shift.

What if you used a computer to simulate the throwing of a dice? If you knew entirely what initial position it was in, how it was thrown, and what the air movements were like, you could predict what side it would land on. Now the probability would only depend on the quality of your model. If your model had 95% accuracy, then you could say the probability of getting a particular number (the one predicted

by your model) is now 95%. If you were omniscient like God, then the probability of the outcome would always be 100% (this has led some to believe in determinism²). We only need probability because we have ignorance.

In his book, *The God Delusion*, Richard Dawkins demonstrates an understanding of this starting point when he says, “any probability statement is made in the context of a certain level of ignorance”. Lack of ignorance would make probability redundant.

What is the probability of our universe?

What is the probability of our universe? By itself, this question makes no sense. What’s the cause, effect, knowledge, and ignorance and, most importantly, what’s the proposition?

In this case all our knowledge is the effect (our universe, which we observe every day) and our ignorance is its cause (since the origin of the universe happened long before we were born, none of us observed the cause). So we *should* be

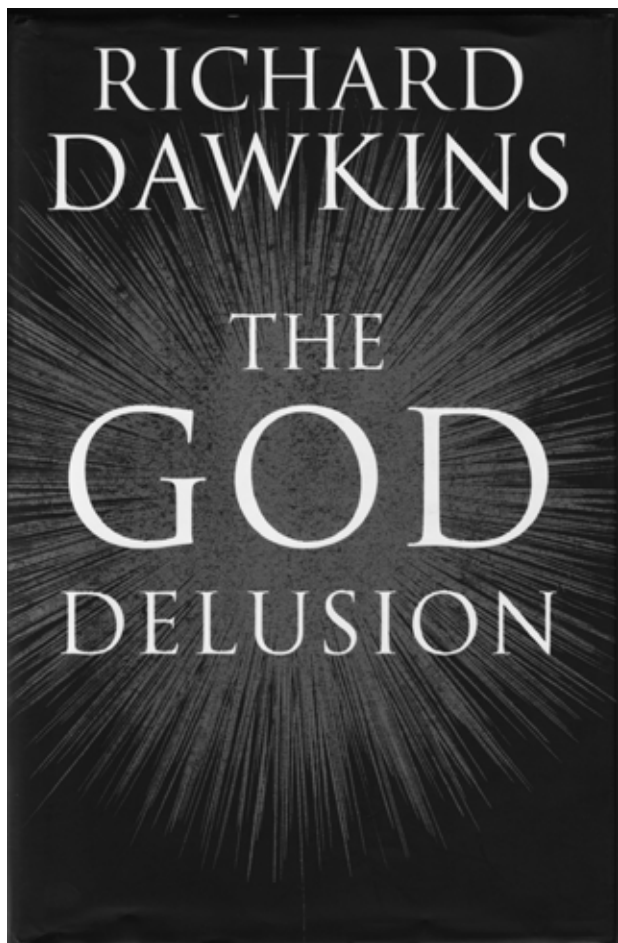


Figure 1. Richard Dawkins' *The God Delusion* is a world-wide best-selling book defending atheism, first published in 2006.

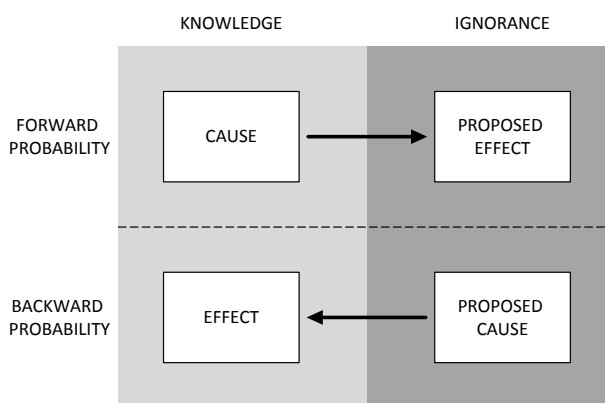


Figure 2. The relationship between the five components of probability—causation, knowledge, ignorance, proposition, and direction

asking in terms of *backward* probability: “What is the most probable *cause* of our universe?”

I think it is this confusion that created the ‘weak anthropic principle’ (i.e. that only in a universe capable of eventually supporting life could there be living beings capable of observing and reflecting upon its unlikely, fine-tuned, and life-supporting properties). It is as if someone considered the question, ‘What is the probability of our universe?’ and realised that our universe *does exist*. As a *known outcome*, its probability is 100%, regardless of the cause. The weak anthropic principle amounts to no more than: “Whatever the cause of our universe, the effect is definitely our universe”—a tautology, and thus true, but it doesn’t mean much. *Getting the direction right is important when using probability.*

But if the probability of our universe is actually 100%, why do we hear (e.g. as part of a fine-tuning argument) that “our universe is improbable”? In this instance, the person saying this is using a shorthand, where they are implicitly proposing a mindless, random cause,³ for the purpose of assessing the forward probability of that cause (e.g. for a logical argument using *reductio ad absurdum*). Dawkins uses the term ‘statistically improbable’ with this shorthand throughout his book, and defines it (albeit in the introduction to his 10th anniversary edition) as meaning “unlikely to come about *by chance* [emphasis added].”

What is the probability of a drawing of a house? It depends. If I throw crayons at a piece of paper, then to end up with a drawing of a house is improbable. However, if I give the paper and crayons to a five-year-old, then a drawing of a house is very probable. By using our five components of probability, we now see that *clarifying the proposition is also critically important when using probability.* The probability of something coming about by chance is only relevant if it *did* come about by chance. And just like with the crayons and paper, the universe may only be ‘statistically improbable’ (as Dawkins calls it) when we propose a mindless and random

cause. Dawkins' use of this descriptor acknowledges that naturalist theories for the origin of the universe most likely wouldn't result in the universe.

This so-called 'improbability of the universe' is well known in the atheism debate. In *The God Delusion*, Dawkins set out to address this argument from both ends—by trying to demonstrate a relatively lower probability of the theist's alternative, and to increase the probability of the universe.

What is the probability of God?

Dawkins presents the argument that the improbability of the universe is dwarfed by the improbability of God. He's using the same shorthand again—assuming a random process as the cause—and effectively there are three different cause-effect relationships that he discusses (each of which are *backward* probabilities), summarized in the following table:

Item#	Known Effect	Proposed Cause	Verdict
1	Our universe comes into being	Random process	Very improbable
2	Our universe comes into being	An act of God	Actually quite probable, if there <i>is</i> a god
3	God comes into being	Random process	Very, very improbable Even less probable than Item 1

You won't find Item 2 explicit in Dawkins' book. But you will find he acknowledges that, when looking at the universe, there is a temptation to attribute the appearance of design to a designer. And in his saying that the theists' 'design solution' only *transfers* the problem of statistical probability from the universe to its designer, one can infer that none of the problem is left behind if one concedes the transfer. So when he then argues that God is an improbable *effect*, Dawkins essentially acknowledges that God is a probable *cause*.

God is not an effect at all

The more astonishing thing about this argument Dawkins makes is that Christians, and *all* philosophical theists, *don't* believe that God was the effect of a random process, or that he is the effect of any other generation process. They rather believe that God had no beginning, is not an effect and has no cause. Dawkins' probability statement applies to a proposition that no one is proposing! (Hence one response that Dawkins anticipated is a valid response: 'I don't believe in the same God that Richard Dawkins doesn't believe in.')

Amazingly, Dawkins addresses this argument in his book, *with a single-sentence dismissal*. He refers to Aquinas' first three proofs of God, the second of which is 'the uncaused cause':

"Nothing is caused by itself. Every effect has a prior cause and again we are pushed back into regress. This has to be terminated by a first cause, which we call God."

Dawkins then states:

"... these arguments rely on the idea of a regress and invoke God to terminate it. They make the entirely unwarranted assumption that God himself is immune to the regress."

But this 'unwarranted assumption' is not an assumption at all—it is the essential tenet of theism and the whole point of the argument. If you follow a path it either terminates or goes on forever. It's not an *assumption* to say that a termination has the properties of a termination. If the termination has the properties of a continuation then it's not a termination, and you need to keep looking.⁴ Thomas Aquinas rightly understood that there is either an infinite series of cause and effect or an ultimate cause that is, as Dawkins puts it, 'immune to regress'.

To assess the probability of God the effect, it is Dawkins that has to *assume* that God *is* an effect of some naturalistic process. He does this in fact for the rest of the argument—and concludes emphatically that it is highly improbable (as represented in Item 3 in the table above). By his own reasoning,⁵ one should then defer to the more probable solution, which is that God is *not* an effect. So the remainder of his argument only goes to show that this 'assumption' made by Aquinas is, in fact, warranted—and that without it, God is not God.

An uncaused cause—is that possible?

That God had no beginning and no cause is not easy to comprehend.⁶

We can't easily think about something unbound by cause because we, and time itself, *are* bound by cause. Every moment of time is caused by the moment that preceded it due to the working of natural laws, many of which are characterised by *conservation*. Mass and energy is conserved, momentum is conserved. Nothing spontaneously begins. Out of nothing, nothing comes—*ex nihilo, nihil fit*.

While *difficult* to fathom it should also be *easy* to believe, for at least three reasons:

The first reason is that logically *something* had to have no beginning or no cause, and it probably wasn't the universe. If the universe itself began without a cause, this would mean that the very first moment of our universe is fundamentally different to all the others (certainly not a uniformitarian proposition!). The universe's coming into existence would represent a complete violation of the

conservation laws that have bound it ever since. And when something happens at a point in time, we reasonably ask—due to our long years of experience living in time—‘Why?’ We know that time facilitates causality, and uncaused things cannot happen in time.

A (deservedly anonymous) blogger, quoted by Dawkins in *The God Delusion* said:

“Ask where that bloke [God] came from, and odds are you’ll get a vague pseudo-philosophical reply about having always existed, or being outside nature. Which, of course, explains nothing at all.”

However, that response is not ‘pseudo’ philosophy, but rather, good philosophy. Our universe has properties that make it a poor candidate for an explanation of its own origins. Its bondage to the progression of causality and the persistent direction of that causality, which is towards decay and disarray, mean that it doesn’t have the *expected* properties of a self-existent phenomenon. Consequently, if you are going to propose God as an alternate solution, it would make no sense to ascribe to God those same properties! So clearly an essential feature of the ‘God hypothesis’ (to borrow Dawkins’ phrase) is that God is uncaused and non-decaying—that He always existed and is indeed ‘outside nature’.

This uncaused God, in contrast to an uncaused beginning to the universe, does not defy causality, but fulfils it. This time-unbound ‘first cause’ solution is the most elegant solution to the problem of the origins of causality. Something uncaused, caused the universe. This *is* the philosophy of theism.

The second reason this should be easy to believe (at least I find it so) is that the Bible teaches it. It teaches that God is the uncaused cause, and does so very clearly. Thankfully God doesn’t expect us to believe in Him *for no reason*⁷ or for reasons that are outside our mental reach—that is why we have the Bible, and historical record, including miracles. Even the most advanced efforts by the cleverest humans don’t reach consensus, and by looking closer and closer at the issue, we just pull down our own foundations and expose the complete limit to our perspective when we try. In the Bible, God’s name is ‘I Am’—an assertion of His aseity (self-existence) and thus lack of origin. This is a rational proposition from Him, so we can reasonably believe it over alternatives. Other passages provide more clarity, including Ecclesiastes 3:14–15: “I know that whatever God does, it shall be forever. ... That which is, has already been. And what is to be, has already been ...”

The third reason I have, though a bit nebulous, is that alternative solutions amount to the same burden of belief—they’re just as difficult to comprehend!

If our universe was, in fact, eternal and non-decaying—as was believed by the majority of atheists up until early last century—then it would have the same properties and be just

as difficult of explanation as God is. “What made the universe like it is?” one would ask, for which the answer would be: “Nothing made the universe like it is, because nothing made the universe—it has always existed.”

Maybe you can believe that our universe itself could be the uncaused cause and have a spontaneous beginning.⁸ But you will never see Dawkins using this argument. He’ll appeal to the heights of improbability and an unfathomably large multiverse to avoid this. The reason? If you can believe this, then in principle you have accepted all the same logical steps required to believe in theism. If our universe could be uncaused, and hence without need of explanation, then so could God. And when faced with two rational explanations, it seems more compelling to believe the one with evidence.

The anthropic principle in Dawkins’ hands

If I throw a rock to hit a street sign on the other side of the road, with one attempt, I will almost certainly miss. With 10 attempts, I may get a hit. If I throw for a day, it’s almost inevitable that I will hit it several times.

In addition to addressing the probability of God, Dawkins attempts to increase the probability of the naturalistic narrative (Item 1 in the table), by appealing to a very large quantity of ‘attempts’ as capable of explaining any improbable ‘successes’. He calls it the application of the anthropic principle—that is, one success becomes unsurprising *if* there are many other failures around it.

But what if the pole is further away than I can throw? I could have an infinite number of attempts and still never hit it if it is not merely improbable, but impossible. So in his argument, he makes two assumptions. 1) That the spontaneous unguided development of life is *possible*. 2) That there are *sufficient* attempts that an eventual successful outcome is *probable*. He may object to miracles because they aren’t repeatable and are never observed, but in this instance he is trying to provide nature sufficient opportunity to do something also unrepeatable and never observed. However, the magnitude of these assumptions, given the actual improbability involved, is phenomenal!

In reality, for Dawkins these are only assumptions in the same way that Aquinas’ ‘termination’ is an assumption. They are not assumptions. They are the whole point of his argument. They constitute a necessary condition for the naturalist narrative; for naturalism to be true, somehow these assumptions have to be. Those who consider an Aquinas-style ‘uncaused’ God hypothesis *unfathomable* need to contemplate the naturalist miracle of the first ‘simple’ cell. In doing so, they need to face two things. Firstly, Aquinas’ ‘uncaused cause’ may be difficult for the mind to comprehend, but it is possible, and as a solution has higher probability (see table). Secondly, the Aquinas solution

has evidence—both historical and scientific. In contrast, the naturalist narrative is unobserved and cannot even be considered probable with the entire history of the entire observed universe providing opportunity for it. As Sarfati demonstrated in his portion of *Evolution's Achilles Heels*,⁹ if one generously allows that since the beginning of our universe (granting naturalism the vast ages it assumes) there have been 10^{110} opportunities for chemical reactions to create the simplest form of life, this is not nearly enough for an event with a likelihood of 1 in 10^{5035} !

Is the multiverse improbable?

Though Dawkins may contest this assessment of probability and believes that an explanation of chemical evolution will yet be found,¹⁰ he still has to appeal to the *unobserved*, even constructs larger than the universe (see below), to complete the naturalist narrative. (Note that without any role for *observation*, this cannot truly be called science.)

One idea that Dawkins approves of regarding the fine-tuning (and subsequent ‘improbability’) of our universe is the multiverse idea. Of that, he said:

“The key difference between the extravagant God hypothesis and the apparently extravagant multiverse hypothesis is statistical improbability. The multiverse, for all that it is extravagant, is simple. God, or any intelligent, decision-taking, calculating agent, would have to be highly improbable in the very same statistical sense as the entities he is supposed to explain.

“The multiverse may seem extravagant by the sheer number of universes. But if each one of those universes is simple in its fundamental laws, we are still not postulating anything highly improbable.”

Here, the term probable still means the probability of *resulting from mindless natural causes*. But what does his discussion of the ‘statistical probability’ of the multiverse imply? Is he saying that it is not the ultimate reality and creator of our universe, but rather another entity that requires an explanation, in turn, of its origins? The moment he discusses its ‘probability’ he is, by implication, proposing a random cause for it. So his multiverse is just another link in the chain and there is some sort of multi-multiverse or other structure ultimately responsible for it. The bigger problem between these two ideas he is comparing is not their probability or lack thereof. It is the lack of an Aquinas-style *termination* that is robbing his solution of elegance.

This is also a distinctly sloppy use of probability. His assertion of the multiverse’s higher probability is made without any clarity on the multiverse’s definition, much less the proposed mechanism for its origin. He has no working description of the cause, effect or proposition involved in

his probability statement. It is then an enormous assumption that the probability of such a thing would relate only to its simplicity or complexity. Without a proposition of a cause, how can he know that the probability does not also relate to size? What is the probability that three marbles will be on my desk? Is it a lower probability than that four will be there? And much lower than that seven would? You can’t even comment until you have a proposition for how they got there. How can he assert that a multiverse is probable for its simplicity, and not improbable for its size? In addition to this, he assumes the multiverse is simple only because that allows him to apply higher probability, not because of any specific reason that a multiverse would be simple.

The trick of backward probability

When using backward probability (assessing the probability of a cause), a common method is to propose a cause, and then assess the forward probability of the proposed cause by assessing all of its alternative possible effects (already used a few times in this article). The following inference is often made:

If A is unlikely to result in B, then when I observe B, A is unlikely to be the cause.¹¹

This is a *seemingly* logical inference, but not necessarily true. What if *every* outcome of a cause has very low probability? What if there exist no alternative explanations?

For example, if I throw 10 dice, it is very unlikely I will get 10 sixes. The probability is 1 in 60.5 million. Using the above inference, if I see 10 sixes, it is unlikely they were thrown randomly and more likely they were placed deliberately in that arrangement somehow. That is a reasonable inference.

However, what if the dice rolled were 1, 3, 2, 6, 6, 4, 5, 1, 2, 4, in that order? This outcome also has a probability of 1 in 60.5 million, so the same inference should apply—it is unlikely to have resulted from random processes. Yet a rational observer would not doubt that this unpredictable sequence was generated randomly. Why not? Though this outcome is improbable (1 in 60.5 million) it is not *relatively* improbable—it is just as improbable as every other possible outcome.

So now we compare this with the first scenario and ask what makes the inference work for the case involving 10 sixes? For a random process, these two outcomes are equally probable, but for a structured (non-random) process, these outcomes are not equally probable! A thinking human being is more likely to place them all on the same number. Or they are likely to come off the conveyor belt in the factory all with the same orientation. So it is not the relative probability from the random cause that has changed, but the relative

probability from alternate possible causes. Non-random causes are more likely to create non-random outcomes.

Consider a third scenario: Before I roll the dice I predict that I will roll 1, 3, 2, 6, 6, 4, 5, 1, 2, 4, in that order, and then that is exactly what happens! Now you may reasonably say it is unlikely that the dice were rolled randomly and more likely that it was rigged somehow. The reason this time is that I can differentiate a class of outcome. There are two possibilities now:

- A. I could guess correctly with a probability of 1 in 60.5 million, or
- B. I could guess incorrectly with a probability of 99.9999983%.

In this case the *relative* probability of a correct guess is extremely low, though the relative probability of the sequence itself is unchanged from the second scenario.

So whilst it seems logical, the above inference cannot be used without two additional considerations:

1. The *relative* probability of the effect resulting from the *proposed cause*. Are other outcomes any more likely?
2. The *relative* probability of the effect resulting from *alternative possible causes*. Is the relative probability any different if there was a different cause?

Sometimes when these considerations are neglected, people are unlikely to notice. In fact, evolutionists have possibly done their own argument harm due to this error. Consider this famous question: What is the probability that a million monkeys, randomly typing letters, would eventually write Hamlet? Of course that is very improbable. However, even if you had Shakespeare himself *intentionally* writing *non-random* letters you still aren't likely to get Hamlet—especially not *word for word*. After all, Shakespeare wrote some 37 plays, and only one of them is Hamlet. If he were to write a thousand more, Hamlet still isn't likely to recur.

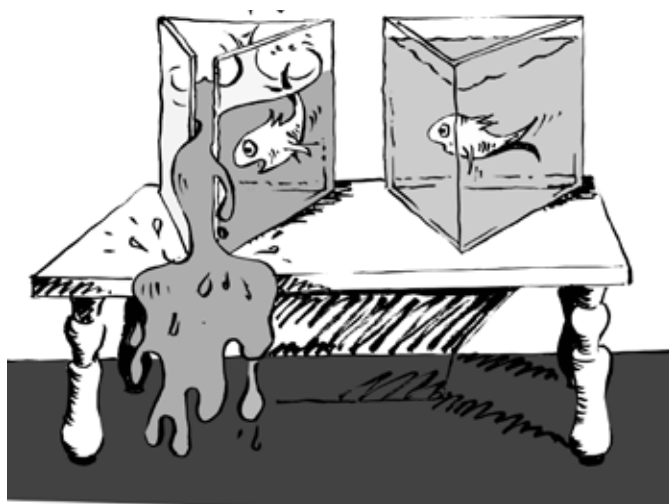


Figure 3. A fine-tuned fish tank—only a slight deviation in the design of the base of this tank will make it incapable of supporting life.

The fact is, you don't really need the monkeys to write *Hamlet*, you just need them to write *a play that makes sense*. What becomes relevant then is the likelihood that a random array of letters will make sense. This is a much higher probability than that a random array of letters will be Hamlet. So with this correction, the probability increases by many orders of magnitude, but when using English letters and the English language, the probability is still vanishingly small.¹² What matters in this situation is not the specific outcome, but the *class* of outcome and its *relative* probability.

Is fine-tuning improbable?

The fine-tuning of the universe refers to the precision required in the design of the universe, and the location of man within the universe, for our life to be possible. The fine-tuning of the laws of nature is a well-established scientific truth.¹³ Because of its quantifiable probability, this has taken its place as one of the strongest teleological arguments for God's existence.

Dawkins objects to the idea of a God who is an “intelligent knob-twiddler, who adjusts the dials of the physical constants so that they have the exquisitely precise values required to bring evolution, and eventually us, into being”. However, his argument is not really explained. It seems more an emotive than a rational reaction. After all, he also said that he finds the idea of a multiverse an elegant solution—and the multiverse idea he was referring to is nothing more than an *unintelligent* knob-twiddler that adjusts the dials of the physical constants. So he doesn't have a problem with knob-twiddlers *per se*, just intelligent ones.

However, in saying this, I believe Dawkins is downplaying the higher probability of God as a cause of our universe. By implying that God would use trial and error, he makes it seem that our universe is still improbable even with God as the cause. So if there is a God, what is the relative probability of our fine-tuned universe? Is it any higher than from random causes?

If I were to make a fish-tank with a triangular base (figure 3, right side), then I will create three walls that meet at three edges. Looking at that tank, it could be considered fine-tuned, in the sense that the three sides could more easily *not* make a closed triangle. Let's use some mathematics to describe the base of the tank. As a triangle, the ratio between the sine of the angle on one side and the length of the side on the other would be exactly the same in all three cases that you can measure it (called the *sine rule*). If you lived within that tank, you could observe this, and marvel that any slight variation of this ratio would cause your tank to gain an open edge (figure 3, left side) and leak—hence no longer supporting your life! With some more information, you could perhaps estimate the permissible variation in these

ratios that would cause that leak! You could rightly conclude that a random line-drawing machine drawing sets of three lines on millions of pieces of paper is unlikely *ever* to draw a triangle with the same properties as the base of your tank. As you have described it—your tank is fine-tuned!

However, I as the designer of that triangular base could draw an infinite number of enclosed triangles capable of supporting life in the tank. For me, it is neither amazing nor ‘improbable’ that I stopped my pen where I had started it as I drew up the plans. In fact, it was easy. Shakespeare might as easily have written *As You Like It* as *Hamlet* and been satisfied with the outcome. If we look at God as a probable cause, then our exact universe is still improbable. But only in the sense that Shakespeare writing *Hamlet word-for-word* is improbable, or me drawing that specific triangle is improbable. But what’s the *relative* probability of the *class* of outcome? Is it really knob-twiddling to draw a triangle?

We’re made in God’s image—though our brains may consist of chemical processes, we have an awareness; we have capacity for abstract thought, imagination, and creation. Though our power to both think and act on our thoughts is limited by nature, this ability is still modelled off God, and this argument can also be used for God. Thinking is in God’s nature, and He does it with ease. There is a greater *relative* probability that an intelligent God would make a universe *that makes sense* rather than a universe that doesn’t. Or, to paraphrase John Lennox, it makes complete sense that a rationally intelligible universe would ultimately be derived from an eternal, rational intelligence.

References

1. In this instance, my determination of the probability comes from my knowledge of its symmetry; in other instances my *knowledge* of probability may come from *statistics*. Statistics is the measurement of past outcomes, and is the counterpart to probability. If I threw the dice 3,000 times, and it landed on a ‘three’ 1,000 times, then I could say that the *statistical* probability of getting a three is one in three (with a measurable confidence—the more times I throw it, or the greater my sample size, the greater my confidence in my prediction). In this hypothetical case, my statistics tell me I probably have a loaded dice!
2. Determinism says that if one could know the current location of every atom in the universe, every bit of light, *all* activity in the universe in this moment, and feed all that knowledge into a simulation that knew all the laws of nature—then one could predict the entirety of the universe’s future exactly, and no alternate future is possible.
3. This use of probability as a property is frequent in explanations of the second law of thermodynamics, where the ‘probability’ of a given macroscopic state (macro-state) is a property that directly relates to its entropy and means the proportion of unique micro-states that would result in that macro-state. Homogeneity or equilibrium is the most probable macro-state because the largest number of unique micro-states would result in it, and the law says that real processes always work towards this most ‘probable’ (highest entropy) state.
4. Like a Hindu might learn about gods that are clearly insufficient to be the ultimate origin, and hence continue enquiring until they learnt of Brahman, the only Hindu god with the attribute of aseity (self-existence).
5. Dawkins: “... the fact that we can neither prove nor disprove the existence of something does not put existence and non-existence on even footing”.
6. ‘Has no beginning’ is in fact an understatement to most theists. We have no reason to think that God’s existence is even a chain of causality. In addition to having no beginning, His infinite life isn’t necessarily arranged as a chronological ‘sequence’ like our finite lives are. God has thoughts and is intelligent, so contains *logical* sequence in some way. He can interact with

us in time, and was able to cause time. Beyond that we are entirely out of our depth, as God Himself says in the Bible: “For as the heavens are higher than the earth, so are my ways higher than your ways and my thoughts than your thoughts” (Isaiah 55:9). God is *outside* of time. C.S. Lewis once described it that time is a line drawn on an infinite piece of paper that starts at one point and then continues infinitely after that. And God is the piece of paper. To put it another way, the God we may interact with today, has access to no less a vivid or complete knowledge of the future or the past than he does of the present. Our knowledge of the past, in contrast, is incomplete and inaccurate, and we have no knowledge of the future at all. See how the deeper we look, the more difficult the ‘uncaused cause’ is to fathom?

7. This is in contrast to the common erroneous way in which ‘faith’ is used by atheists and unfortunately by some Christians, that it is belief in something *for no reason*, rather than belief in something *without complete proof*. The former would be what we call ‘blind faith’. Blind faith is rather foolish, is not the faith commended in the Bible (Hebrews 11) and is never expected by God in the Bible.
8. Though it’s hard to reason about something we can’t really fathom, one might think self-creation would give the universe a scary instability. It popped into existence once, so why doesn’t it ever undergo spontaneous change again, or pop out of existence? One might perceive that at its core, an uncaused universe must retain the ability to do uncaused things. The rules governing its predictability are themselves uncaused and hence could at any moment unravel.
9. *Evolution’s Achilles’ Heels*, authored by nine Ph.D. scientists, Creation Book Publishers, Powder Springs, GA, 2014; creation.com/s/10-2-640.
10. Dawkins in *The God Delusion*: “I shall not be surprised if, within the next few years, chemists report they have successfully midwifed a new origin of life in the laboratory” and “I do not for a moment believe the origin of life was anywhere near so improbable [as to occur on 1 in a billion planets] in practice” and “I think it is worth spending money on ... SETI, because I think it is likely that there is intelligent life elsewhere.”
11. People familiar with philosophy and logic will recognize the contrapositive. If the likelihood is made to be zero (i.e. A cannot possibly result in B) then this inference reduces to the law of the contrapositive and is true. But if the probability is only very, very close to zero, this inference may become completely wrong.
12. Since mathematicians started playing in the mud with biologists, this problem has been better defined and assessed. Statistics have been brought to bear to define the tendency of random genetic ‘words’ to have meaning and specifically to be better than whatever words were modified incrementally to write them, and the problem facing neo-Darwinian evolution has only become worse. Refer *Genetic Entropy* by J. Sanford.
13. Lewis G.F. and Barnes, L.A., *A Fortunate Universe: Life in a finely tuned cosmos*, Cambridge University Press, 2016; see review by Statham, D., in *J. Creation* 32(1):48–52, 2018.

Nick Kastelein received a Bachelor of Mechanical Engineering B.Eng (Mech) (Hons) at the University of Adelaide. He works at a South Australian engineering consultancy, primarily on design projects in the oil and gas industry and other process industries. He sits on Standards Australia’s committee ME-38-1 for petroleum pipeline design.

Flood processes into the late Cenozoic: part 5—geomorphological evidence

Michael J. Oard

Geomorphologic evidence suggests that the post-Flood boundary is best located in the late Cenozoic. Eight lines of reasoning support this conclusion: large-scale, rapid continental erosion; coastal erosional escarpments; planation surfaces; widespread transport and deposition of hard rocks at high elevations; deep valleys; pediments; water and wind gaps; and submarine canyons. Attempts to explain these features by post-Flood catastrophism are limited and, at present, insufficient.

Geology remains a major research need for creation science. Marvellous examples of design in the biological world abound that support the Bible, but this is not so apparent in the geological world. To counter the prevailing teaching that geology supports evolution and deep time, creation scientists need to develop hypotheses consistent with biblical earth history from which a comprehensive Flood model can eventually be created. In this endeavour, it is important to get the boundaries of the Flood correct.

Many evidences support the location of the Flood/post-Flood boundary in the late Cenozoic over most continental areas. These include seven factors within sedimentary rocks,¹ seven from organic remains,² five tectonic factors,³ and others.⁴ Very often the boundary is indicated in the very late Cenozoic, near the Pliocene/Pleistocene boundary. Locally, it may be in the Miocene, depending on the rocks present. Thus, we need to evaluate each area on its own merits within the biblical geological model.⁵

This paper will focus on eight lines of geomorphic evidence that suggest the Cenozoic is best explained by Flood runoff, rather than by post-Flood processes (table 1). Geomorphology is fairly straightforward, since it concerns the surface of the earth and mainly deals with the topography. It is a field that elicits evidence for the Flood runoff, and thus helps pinpoint the post-Flood boundary. Despite many Flood studies on the subject, few have been written supporting a Mesozoic/Cenozoic boundary. This paper will only summarize the geomorphological evidence for a late boundary and address arguments that the phenomena are post-Flood.

Enormous and rapid Cenozoic erosion of the continents

Continental rocks of all types have been strongly eroded.^{6,7,8} The Colorado Plateau, including the Grand Staircase and the Roan and Book Cliffs, were produced

after an average of 2,500–5,000 m of erosion.⁹ Hundreds of metres of strata erosion has been documented in the basins and valleys of the Rocky Mountains.¹⁰ The central Appalachian Mountains suggest up to 6,000 m of erosion.¹¹ Similar significant erosion can also be observed on many other continents.¹² This erosion was rapid and recent, as shown by several areas in the western United States, like Devils Tower, in northeast Wyoming,¹³ and Navajo Mountain, at the Arizona/Utah border. Much of the erosion occurred in the Cenozoic, including the late Cenozoic. For instance, the massive erosion of the Colorado Plateau began after early Cenozoic strata were laid down,⁹ including the Eocene Green River Formation.¹⁴ The top strata of the Rocky Mountain basins and valleys are early to mid Cenozoic, indicating the erosion occurred during the mid to late Cenozoic.

In contrast, Whitmore has suggested that this erosion was due to the mass wasting of unlithified sediment *after* the Flood. He claimed this erosion was partly caused by abundant rainfall acting on unlithified sediments.¹⁵ However, that hypothesis requires evidential support; no specifics or case studies have been offered in support of mass wasting. If we take the widespread and intense nature of the erosion into account, we see that it is much better explained by Flood runoff.

If mass wasting were responsible for the observed erosion, most of the resulting debris should have been redeposited nearby, on the continents. For instance, mass wasting of the ranges of the Rocky Mountains of the US would have largely moved debris into adjacent valleys and basins or out onto the high plains. But, in general, it appears that most of this eroded material was redeposited on the continental margins.¹⁶ This is consistent with Flood runoff. If the Cenozoic valley fill sedimentary rocks and sediments show evidence of being mass wasting debris, Whitmore and colleagues should substantiate it.

Table 1. Summary of Cenozoic geomorphological evidences best explained by Flood processes. The strength is relative to arguments for a K/Pg (Cretaceous/Paleogene) post-Flood boundary.

Geomorphological evidences	Strength
1. Enormous and rapid erosion of the continents	Strong
2. Erosional escarpments	Moderate
3. Planation surfaces	Strong
4. Long-distance transport of hard rocks	Strong
5. Deep canyons and valleys	Strong
6. Pediments	Strong
7. Water and wind gaps	Strong
8. Submarine canyons	Weak

Erosional escarpments

In addition to volume and extent, the character of the erosion also indicates Flood erosion. For instance, *coastal great escarpments* (CGEs) are high cliffs or steep slopes found along Atlantic-type or passive continental margins. CGEs are often over 1,000 m high.¹⁷ They tend to run parallel to the coast, but rather than being the result of faulting, they have likely been *eroded inland* from the coast over distances up to 200 km. CGEs separate a high plateau (itself an erosional or planation surface of low relief with erosional remnants) from a coastal plain of moderate relief. Some of the largest changes in topography on earth are CGEs.¹⁸

The best examples of CGEs are found in southern Africa, eastern Australia, eastern Brazil, and western India.¹⁹ The CGE around southern Africa is over 3,500 km long (figure 1). The elevated plateau above the escarpment is part of a planation surface that covers much of Africa.^{20,21} The escarpment is more than 100 km inland along the coast in Namibia and over 200 km inland in southeast Africa. The Drakensberg Great Escarpment of southeast Africa is 3,000 m high. The CGE in eastern Australia is 2,400 km long and is 200–1,000 m high (figure 2). These features are problematic for uniformitarianism, but seem to be readily explained by Flood runoff.^{6,7}

These features are also problematic for a post-Flood boundary below the upper Cenozoic. Similar widespread mass-wasting events could have caused large blocks of high-altitude coastal sediments to slide into the oceans. However, if so, large masses of landslide debris on coastal plains, continental shelves, slopes, and rises oceanward of the Great Escarpments would be expected. Until seismic and drilling data indicate that these sedimentary wedges are the result of mass wasting, that hypothesis remains weak.

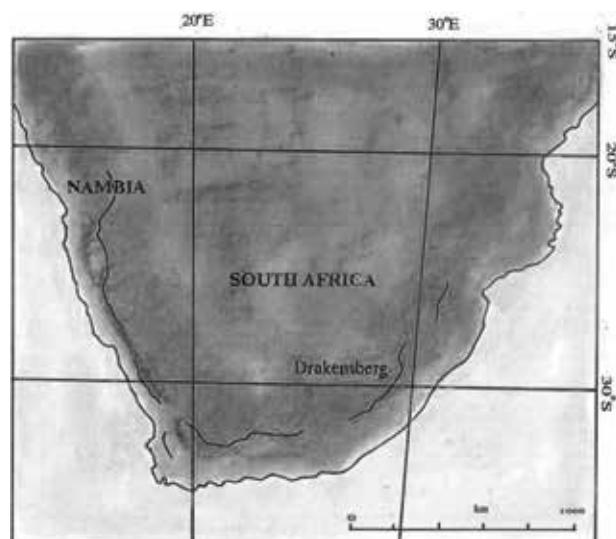


Figure 1. Great Escarpment that parallels most of the coast of Southern Africa (drawn by Melanie Richard)



Figure 2. Australian Great Escarpment in the Grose Valley, west of Sydney, Australia, from Govetts Leap (courtesy of Tas Walker)

Planation surfaces

Planation surfaces are generally flat erosion surfaces, seen in many areas of the world.²² Some of these surfaces have been exhumed. By comparison, planation surfaces that form when rivers overflow their banks and erode rocks along the bank (today's analogue) are very small.²³ Uniformitarians try to link the physical and temporal scales and extrapolate that such processes can create continent-scale planation surfaces, but field data are not consistent with this idea. Present processes do not form planation surfaces of any *significant size*.

Large planation surfaces are found worldwide. Most of Africa is a planation surface that has been warped and faulted.^{18,19} The Tibetan Plateau is another vast, dissected planation surface, which covers about 700,000 km². One Chinese scientist described it as a “vast planation surface”.²⁴ Much of Australia is a planation surface, including the Tableland of eastern Australia, which has numerous erosional



Figure 3. Near-vertical sedimentary rocks have been bevelled to form the New England Tableland, Australia, a planation surface. Later, more channelized erosion carved the gorge, now home to the Wollomombi Falls.



Figure 4. Lake on the Piedmont, west of the Blue Ridge Mountains, US, near Parkersville, South Carolina, showing general flatness of the terrain

remnants called inselbergs (figure 3). The Piedmont province, east of the Blue Ridge Mountains of the US (figure 4), represents a planation surface eroded across variably deformed rocks of various lithologies.

Planation surfaces are readily explained by Flood runoff during the Sheet Flow Phase.²⁵ Only widespread currents flowing at great velocities could create such surfaces. The existence of such currents is reinforced by the veneer of rounded large rocks deposited as a lag on many such surfaces. Instead of being formed today, they are actually being destroyed or reduced by weathering and erosion.

Whitmore and Garner stated that planation or erosion surfaces were formed both by Flood runoff and by post-Flood precipitation:

“Very widespread erosion surfaces would also be expected to have formed in association with the recession of the ocean waters from the continents at the end of the Flood and with the intense precipitation predicted by models of the early post-Flood climate (Vardiman, 2003).”²⁶

Wise also believes that heavy post-Flood precipitation caused sheet erosion, which in turn formed the planation surfaces:

“If the water came down fast enough, it would not channel itself into streams but rather flow in sheets over the earth’s surface. In some areas this would erode sediments and rocks in a planar fashion. This might provide an explanation for the widespread planing off of rocks evidenced in Tertiary sediments. In other areas the water would slow down enough to begin dropping out the sediments it was carrying. This sheet deposition may provide an explanation for the extensive, nearly-flat wedges found in Tertiary sediments.”²⁷

However, there is no evidence to support this idea. No matter how much rain falls, it tends to cut channels, especially in rough terrain. The heavier the rain, the faster the channels form. C.H. Crickmay writes that no modern processes can flatten the land:

“Flat, near-horizontal land cannot be seen to have been made at the heights at which most of it is now seen. Such landscape [sic] as flat-topped hills or high plateaux shows *no* process in action that might favour or maintain its flatness.

Consequently, one cannot say that any geological work *now observable* has made it as flat and level as it is. The completion of its flattening appears to have been in the past. ... The very existence of much flat, near-level ground at all elevations demonstrates not only its extensive forming, but also its long survival [emphasis added].”²⁸

One hypothesis for the origin of pediments proposes sheet flooding from intense thunderstorms.^{29,30} Shallow sheet flooding has indeed been observed during thunderstorms in dry environments.³¹ Can these sheetfloods cause planar erosion? No, because the flat surface must *first* exist. This is a fatal flaw in the hypothesis. Oberlander stated:

“Early proposals that erosive sheetfloods could form pediments are defeated by the fact that sheetfloods require planar surfaces and are a consequence rather than a cause of planation.”³²

Besides, one can produce only so much rain in a cloud volume. Even hypothetical ‘hypercanes’ could not generate enough precipitation to plane large areas.

Long-distance transport of durable detritus

During Flood-scale erosion, rocks of all hardness were eroded. Soft rocks, like shale, were quickly pulverized. Harder rocks, such as quartzite, were transported long distances, rounded, and then deposited as the currents slowed. For instance, we observe thick-bedded quartzite outcrops in the western Rocky Mountains of northern and central Idaho and extreme western Montana. These quartzite rocks are mostly from the Precambrian Belt Supergroup. These were eroded, and the detritus, ranging up to boulder size, was rounded and carried across the region.^{6,7} West of the continental divide, these rounded quartzite rocks were found all the way to the Pacific Ocean, 600 km away. East of the continental divide, they were carried onto the plains of southern Canada, up to 1,300 km. Well-rounded quartzites accumulated in deep basins in thicknesses up to 4,575 m. Close examination of the individual rocks shows the presence of percussion marks—semicircular, shallow cracks indicative of high-velocity impacts during transport.³³ Such marks have not been observed to have formed in modern settings.

Durable rocks also accumulate in thick deposits close to the edge of rising mountain ranges, like the Himalaya, Tian Shan, and Zagros ranges in Asia, as well as the Tibetan Plateau.³⁴ The resulting conglomerates reach over 1,800 m in thickness, and form sheets up to thousands of km across, along the edge of the mountains. One such deposit, adjacent to the western Himalaya Mountains, is 3,400 m thick.³⁵ The gravel thins away from the mountains, towards the centre of the surrounding basins.

Almost all of this occurred in the Cenozoic, mostly the mid to late Cenozoic. It is more difficult to explain such deposition of cobbles and boulders by uniformitarian processes than by late Flood runoff.

The only post-Flood explanation for the widespread distribution of quartzite rocks in the northwest United States and Canada I currently know of was offered in the review of a paper Peter Klevberg and I submitted to the 1998 International Conference on Creationism. An anonymous reviewer suggested that hyperconcentrated mass

flows in a post-Flood subaerial environment could have transported and deposited the quartzites in the region.

However, there are several problems with that mechanism. Hyperconcentrated mass flows have a texture between that of a turbidity current and a debris flow. We evaluated the possibility of this mechanism (along with several others) while studying the Cypress Hills gravels. The only mechanism that explained the field data was powerful late-Flood currents.³⁶ The quartzite rocks are well rounded. They were transported up to 1,300 km from central Idaho across the Continental Divide to Saskatchewan and Manitoba.³⁷ They form a layer that averages about 40 m thick over the Cypress Hills, an area of about 3,000 km² on a high plateau. Furthermore, post-Flood catastrophism would have to account for 750 m of erosion over an extensive area surrounding the Cypress Hills which occurred *after* the



Figure 5. Grand Coulee in north-central Washington, US. It formed quickly within days during the Lake Missoula flood. The walls are up to 275 m high and as much as 10 km wide.



Figure 6. Zion Canyon in Zion National Park, Utah, US

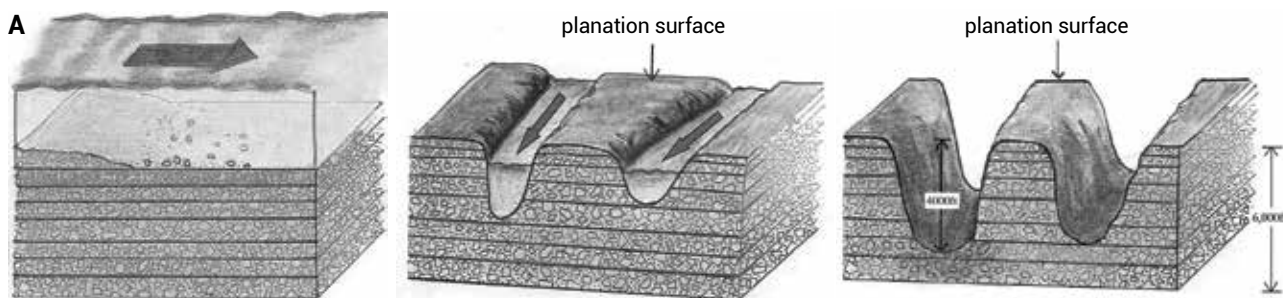


Figure 7. Schematic of sheet flow erosion that transforms into channelized flow erosion in the Absaroka Volcanics of northwest central Wyoming and south central Montana (drawn by Melanie Richard).

A. Deposition of the multiple volcanic landslides of Absaroka Volcanics, which is over 1,830 m thick and covers about 23,000 km².

B. Sheet deposition gave way to sheet erosion forming a planation surface, which transformed into channelized erosion.

C. Channelized erosion cuts canyons up to 1,220 m deep before the floodwater finally drains.

quartzite rocks were initially spread.³⁸ Finally, since quartzite rocks are abundant on multiple planation surfaces of the high plains, multiple hyperconcentrated flows over long distances would be required.

Since it is common to find well-rounded quartzites several mountain ranges away from their source, Whitmore wondered how they were transported over the ranges.³⁹ Since quartzites are also found on top of mountain ranges in the northwest United States, the mountains must have uplifted during or after the quartzite rocks were deposited. All these factors argue for late-Flood erosion and deposition.

Deep valleys and canyons

Valleys and canyons come in all sizes and shapes, but some are quite deep. The eruption of Mount St Helens showed that valleys and canyons with vertical walls, both in hard rock and unconsolidated sediment, can form quickly by catastrophic processes.⁴⁰

Near vertical-walled canyons are young features, becoming wider and more V-shaped with time.⁴¹ Catastrophic flows of water carved the vertically walled Channeled Scabland of eastern Washington by the Lake Missoula flood at the peak of the Ice Age (figure 5).^{42,43}

Deep valleys or canyons occur worldwide. Grand Canyon, 1,800 m deep, is the most well-known. Zion Canyon in southern Utah is nearly 600 m deep (figure 6). Copper Canyon in the Sierra Madre Occidental Mountains of the state of Chihuahua, northwest

Mexico, is a magnificent example of a deep canyon that starts near a mountain divide.⁴⁴

Some of the best examples of the rapid formation of deep canyons and valleys are found in the canyons of the Absaroka Volcanic Field of northwest Wyoming, which have peaks that exceed 3,660 m above sea level.⁷ These volcanic rocks are up to 1,830 m thick and cover about 23,000 km² in the lower Cenozoic. After deposition, their top was eroded into a planation surface, strongly suggesting this all occurred during the Sheet Flow Phase of the Flood. As the water level decreased, channelized flow eroded canyons up to 1,200 m deep, dissecting much of the planation surface (figure 7).

Wise stated that all canyons on the earth's surface were formed by catastrophic floods during the first millennium after the Flood.⁴⁵ The Lake Missoula flood surely is his analogue.^{38,39} Though few detailed studies have followed this proposal, it is a reasonable idea. The main difficulty is trying to explain the source of the water to carve canyons after the



Figure 8. Pediment in the Ruby River Valley along the western slope of the Gravelly Range of southwest Montana, US. Note that the sedimentary beds of the valley fill sediments dip right (east), while the pediment surface dips left (west) and shears the sedimentary layers evenly at a low angle.

Flood. Grand Canyon illustrates the problem. Its post-Flood formation, suggested by Wise and others, requires large lakes to supply the floodwaters, east of Grand Canyon. However, there is little geological evidence for the gigantic lakes or the dam-breach hypothesis.^{46,47} A late Flood origin, using the two-phase model of sheet flow followed by channelized flow, is a much simpler and more reasonable theory.⁴⁸

Pediments

A pediment is a planation surface at the foot of a mountain, ridge, or plateau. Pediments occur globally and number in the thousands. Hundreds are found in the western United States alone (figure 8). Although a few geomorphologists have tried to make the case that pediments are still forming today, active pediment formation has not been documented. Thus, pediments also conflict with the uniformitarian principle.⁴⁹ They were apparently formed by water, since most are capped by rocks rounded by water. Williams acknowledged:

“A major obstacle to agreement on the origin of modern hard-rock pediments and their relationship to adjacent alluvial deposits is that the mountain front and flanking pediment appear frozen at the present instant of time.”⁵⁰

In fact, the only modern processes observed on pediments is their *dissection and destruction*.^{51,52} Almost all pediments appear to have formed in the mid to late Cenozoic based on the rocks they are formed across. The best explanation for the field data is that they were formed by fast channelized currents during Flood runoff.^{6,7,53}

Whitmore has addressed their origin several times.^{35,54} As far as I know, he has offered *no* hypothesis for their origin. Rather, he has objected to the late-Flood theory, pointing out that pediments can be mistaken for depositional surfaces and there should be pediments associated with the Lake Missoula flood.

However, even a cursory examination can readily distinguish a pediment from a depositional surface. Pediments are predominantly *eroded* into hard rock, leaving a thin veneer of mostly rounded rocks. In contrast, mass wasting debris flow surfaces exhibit thick alluvium. For example, the Madison River Valley of southwest Montana possesses outwash terraces, alluvial fans, and pediments. The tops of the outwash terraces are flat with angular boulders transported by icebergs. In contrast, pediments gradually slope up to the mountain. An alluvial fan is a fan-shaped formation found at the mouth of a mountain valley, and when alluvial fans combine forming a bajada, there is still a low area between fans.

Whitmore believes that pediments in enclosed basins, such as the Great Basin, including Death Valley and Cache Valley, require post-Flood processes.⁵⁵ But even in these settings,



Figure 9. Two pediments about 30 km west of Wells, Nevada, US (view southeast). Highway altitude about 1,650 m and upper pediment at the foot of the mountain ranges is estimated at about 2,100 m.



Figure 10. A pediment in Cash Valley, Utah (view east southeast)



Figure 11. A pediment in Marsh Valley along Interstate 15 about 30 km southeast of Pocatello, Idaho (view southwest)

a Flood origin is possible. They could have been carved when the water was deeper or the terrain higher. Subsequent tectonic movement could have caused the basin to sink, as is likely for the Great Basin. The pediments in the Great Basin are generally high above the valleys (figure 9). This would favour formation during deeper channelized flow or when the valley fill was thicker. Whitmore pointed to Cache Valley, near Logan, Utah, in the northwest part of the Great Basin, as containing post-Flood pediments. The pediments in this valley are generally at moderate altitudes above the bottom of the valley (figure 10). However, Cache Valley is separated from Marsh Valley, southeast Idaho, by a low, wide

pass. Cache Valley connects with the steeper Marsh Valley to the north in extreme southeast Idaho. There are pediments all along this segment (figure 11), showing that channelized flow during Flood runoff, starting in southern Cache Valley and flowing north-northwest, carved the pediments. Other individual examples require further field work, but experience has shown that the late-Flood model is feasible and preferred in most well-studied examples.

A key to the origin of pediments is their veneer of rounded rocks, which strongly suggests deposition by water. This is especially true for the *exotic rocks* on pediments, which were transported hundreds of kilometres. This would require currents flowing parallel to the mountain range or ridge. If pediments were formed by mass wasting, the debris would have come from the adjacent mountains.



Figure 12. The Shoshone water gap through the Rattlesnake Mountains west of Cody, Wyoming, US. The Shoshone River flows east toward the viewer.



Figure 13. The Cumberland wind gap in the Appalachian Mountains along the Virginia/Kentucky border near Middlesboro, Kentucky, US (view northwest from highway 58). This notch has been eroded down about 300 m, as measured on the northeast side.

Water and wind gaps

A water gap is an erosional gap cut through a mountain range, ridge, or other structural barrier, with a river or stream at its base. Figure 12 shows the Shoshone water gap, a 760-m-deep canyon, cut through the Rattlesnake Mountains, just west of Cody, Wyoming. The gap defies uniformitarian explanation because the Shoshone River could have migrated around the mountain range to the south through a low area.

A wind gap is similar to a water gap but lacks the river or stream. Many were probably once water gaps or incipient water gaps before uplift of the ridge, particularly if the ridge is a fault block. Figure 13 shows the famous Cumberland wind gap between Virginia and Kentucky, US. There are thousands of water and wind gaps. For instance, 653 water gaps have been identified in the Susquehanna watershed of the northern Appalachian Mountains that range from 23

to 539 m deep.⁵⁶ The deepest water gap in North America is Hells Canyon, between Idaho and Oregon, that is 2,440 m deep on the Idaho side.

Water and wind gaps are problems for uniformitarian geology. Crickmay noted that rivers seem to cut water gaps as if there were no mountain barrier:

“Admittedly a fascinating picture, a river runs over low, open plains directly towards seemingly impassable mountains but, undiverted by their presence, passes through them by way of a narrow defile, or water gap, to a lower region beyond.”⁵⁷

Water and wind gaps, again dated as Cenozoic, are easily explained by the two-stage late-Flood flow across, and then through, barriers. However, Whitmore suggests that the thousands of water and wind gaps across mountains, ridges, and plateaus over the earth are explained by faults and joints: “In some cases these features might help explain how rivers cut through mountains and topographic highs, or have cut exceptionally deep canyons in short periods of time.”⁵⁸ But water and wind gaps are hardly ever connected with faults,⁵⁹ leaving the origin of water and wind gaps a major problem for Flood geologists proposing a K/Pg Flood/post-Flood boundary.⁶⁰ The best-known water gap, Grand Canyon, illustrates these problems, given the issues with the dam-breach theory.^{42,43,48}

Submarine canyons

Large submarine canyons are also fascinating geomorphological features. They dissect the continental shelf, often oriented perpendicular to the coast. Because submarine canyons formed *after* practically all the continental shelf sediments were laid down, their origin must also account for the sediments. Some are immediately offshore and can quickly exceed Grand Canyon in depth. The deepest is Capbreton Canyon off northern Spain, over 3,000 m deep.⁶¹ The longest is the Bering Canyon, which includes a 95-km fan valley, giving a total length of 495 km—longer than Grand Canyon.^{62,63}

Uniformitarian scientists can explain submarine canyons better than any other geomorphological feature discussed so far. They believe shelf-indenting canyons formed by mass wasting near the shelf edge, and that the canyon eroded shoreward over millions of years. This is a plausible hypothesis given deep time but has one major question. How does continental erosional debris become concentrated at *one* location along the shelf edge so that many mass flow events over a long time carve a canyon in *one* location?

Since submarine canyons are believed to have been eroded in the Cenozoic, it seems that late-Flood channelized flow⁶⁴ may offer a better explanation for their existence than post-Flood mass flow processes.

This subject remains sparsely discussed in creation science literature in terms of a post-Flood origin, but it would be plausible that such models would be similar to uniformitarian ones, but with a compressed timescale. However, post-Flood mass wasting events would need to have been continually depositing sediment at the *same* location at the top of the canyons on the continental shelf to have gradually carved the canyons.

Conclusion

Many geomorphological features are difficult, if not impossible, to explain by uniformitarianism. Likewise, models of post-Flood catastrophism, such as heavy precipitation or mass wasting, also seem inadequate. In contrast, the simple two-stage process of sheet flow followed by channelized flow in retreating floodwaters can explain the terrain features we see today. Since most geomorphological features formed in the Cenozoic, the post-Flood boundary is best placed late in the geological column.

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Michael J. Oard has an M.S. in atmospheric science from the University of Washington and is now retired after working as a meteorologist with the US National Weather Service in Montana for 30 years. He is the author of *Frozen in Time*, *Ancient Ice Ages or Gigantic Submarine Landslides?*, *Flood by Design*, *Dinosaur Challenges and Mysteries*, and *Exploring Geology with Mr. Hibb*. He serves on the board of the Creation Research Society.

What does the catechism of the Roman Catholic Church say about creation?

Matthew Cserhati

Over the past one or two centuries many within the Roman Catholic Church have departed from not only the teaching of their own church on creation but also the clear teaching of the Bible. This, despite the fact that some Roman Catholics have made notable contributions to creationism and that the Roman Catholic Church had adhered to a literal creation before that. This paper reviews the official teaching of the Roman Catholic Church; namely, the Catechism of the Catholic Church as to what it has to say about biblical creation. Interestingly enough, the catechism is generally much in line with a literal-historical interpretation of Genesis 1–11. For example, individuals such as Adam, Eve, Cain, Abel, and Noah are mentioned as well as historical events, such as the Fall into Sin, the Flood and the Tower of Babel. Compromising Roman Catholics are lovingly urged to consider these findings and to return to a biblical understanding of creation and to reject the teaching of evolution which has damaged biblical authority in the church to a large extent.

Despite several examples to the contrary,¹ such as the Kolbe Center for the Study of Creation,² many in the Roman Catholic Church (RCC) have, to a large part, embraced and accepted evolutionary theory, due especially to the influence of the Jesuit order. According to a 2013 Pew Research poll,³ more than 2.5 times as many white Roman Catholics believe that humans have evolved over time, as opposed to a minority that believes that humans have existed in their present form since the beginning. In contrast, about 2.5 times as many white evangelical Protestants believe that humans have stayed the same, as opposed to having evolved over time.

For example, Pope Francis states that when reading the Genesis account of creation, it must be kept in mind that God is not like a magician, who can make everything with a wave of His ‘magic wand’.⁴ The Jesuit order has had a long history of accepting, embracing, and cultivating evolutionary theory; for example, in the person of Pierre Teilhard de Chardin,⁵ whose ideas even influenced the pastoral constitution *Gaudium et spes*.⁶ Yet others, such as Guy Consolmagno, the Vatican’s Jesuit astronomer, aggressively denounce creationism as a ‘destructive myth’ and a ‘kind of paganism’⁷

Whereas some within the RCC espouse a literal six-day creation, many others compromise in this area. Therefore, the goal of this paper is to analyze the official teaching of their church on the issue of creation, found in the Catechism of the Catholic Church (CCC).⁸ We shall see that the catechism (the official teaching of their own church) strongly supports a literal six-day creation, and we therefore encourage more and more Roman Catholics to take up this position, which is clearly taught in Scripture.

Historical figures and events described in the CCC

In 52 paragraphs (pars.), the CCC mentions several historical figures and events from Genesis 1–11, which only makes sense if Genesis 1–11 is to be taken literally. Table 1 summarizes the number of times the names of these figures occurs in the Old Testament (outside of Genesis 1–11), the New Testament, and the CCC. For example, par. 359 of the CCC makes it quite clear that just as Christ was a real person, so also was Adam, and that Jesus Christ as the Creator brought Adam into existence as the first member of the human race:

“359: ‘In reality it is only in the mystery of the Word made flesh that the mystery of man truly becomes clear.’ St. Paul tells us that *the human race takes its origin from two men: Adam and Christ ... the first man, Adam, he says, became a living soul, the last Adam a life-giving spirit. The first Adam was made by the last Adam, from whom he also received his soul, to give him life ... the second Adam stamped his image on the first Adam when he created him. That is why he took on himself the role and the name of the first Adam, in order that he might not lose what he had made in his own image. The first Adam, the last Adam: the first had a beginning, the last knows no end. The last Adam is indeed the first; as he himself says: ‘I am the first and the last’ [emphasis added].*”

In this, the CCC is referring to the Bible (which is the sole highest authority), namely 1 Cor. 15:45: “And so it is written, the first man Adam was made a living soul; the last Adam was made a quickening spirit.”

Par. 504 of the CCC further echoes this sentiment:

Table 1. Biblical names and the number of times they occur in the Old Testament, the New Testament, and the CCC

	Old Testament (outside of Gen. 1–11)	New Testament	CCC
Adam	8	7	14
Eve	0	2	8
"our first parents"	—	—	5
Cain	1	3	2
Abel	4	4	2
Noah	8	5	1

"Jesus is conceived by the Holy Spirit in the Virgin Mary's womb because *he is the New Adam*, who inaugurates the new creation: '*The first man was from the earth, a man of dust; the second man is from heaven*' [emphasis added]."

This paragraph of the CCC refers to 1 Cor. 15:47 and back to the creation of Adam from the dust of the earth as a historical event. Pars. 505 and 539 of the CCC talk also about Jesus being the last Adam. In addition, par. 538 draws a parallel between Adam and Christ in that just as Adam and the nation of Israel were tempted, so was Jesus Christ also tempted three times (Luke 4:13), again underlining the historicity of Adam's personhood.

Besides the creation of man, the CCC speaks about original righteousness in the Garden of Eden, the Fall into sin, Noah's Flood, and the Tower of Babel, which are all important events in salvation history. These events are interlinked with each other (a chain of events which lead up to the coming of Christ), and if one is historical, then all the other events must be historical. If these events did not occur during salvation history, then there is no basis for the sacrificial life and death of Jesus Christ. For example, pars. 56–58 describe Noah's Flood and the covenant that God made with him as well as the dispersal of mankind over the face of the earth after Babel:

"56: After the unity of the human race was shattered by sin God at once sought to save humanity part by part. *The covenant with Noah after the flood* gives expression to the principle of the divine economy toward the 'nations', in other words, towards *men grouped 'in their lands, each with (its) own language, by their families, in their nations*' [emphasis added]."

57: "This state of division into many nations, each entrusted by divine providence to the guardianship of angels, is at once cosmic, social and religious. It is intended to limit the pride of fallen humanity united only in its perverse ambition *to forge its own unity as at Babel*. But, because of sin, both polytheism and

the idolatry of the nation and of its rulers constantly threaten this provisional economy with the perversion of paganism [emphasis added]."

"58: *The covenant with Noah remains in force during the times of the Gentiles, until the universal proclamation of the Gospel. The Bible venerates several great figures among the Gentiles: Abel the just, the king-priest Melchisedek—a figure of Christ—and the upright 'Noah, Daniel, and Job'. Scripture thus expresses the heights of sanctity that can be reached by those who live according to the covenant of Noah, waiting for Christ to 'gather into one the children of God who are scattered abroad*' [emphasis added]."

In this last paragraph, Noah is mentioned together with other well-known historical figures such as Melchisedek, Daniel, and Job. Here Abel, the son of Adam is also mentioned by name. The murder of Abel by Cain is also referred to in pars. 401 and 1736 of the CCC, besides a reference to the garden of Eden:

"*Thus the Lord asked Eve after the sin in the garden: 'What is this that you have done?' He asked Cain the same question.* The prophet Nathan questioned David in the same way after he committed adultery with the wife of Uriah and had him murdered [emphasis added]."

Taking all of this evidence into consideration, we can robustly state that the CCC views Genesis 1–11 in a literal context with real-life human 'actors' in the events which take place in these chapters of the Bible.

The CCC and Mary

The CCC makes several references to Mary as being the 'new Eve' (pars. 2618 and 2853), just as Jesus was the last Adam. Par. 494 even goes so far as to claim that "Comparing her with Eve, they call Mary 'the Mother of the living' and frequently claim: 'Death through Eve, life through Mary'." But according to the Bible, Jesus Christ is truly the last Adam: "For if by one man's [Adam's] offence death reigned by one; much more they which receive abundance of grace and of the gift of righteousness shall reign in life by one, Jesus Christ" (Romans 5:17). It is only a fallible tradition that Mary is equated to be the 'New Eve'; it is not mentioned anywhere in the Bible. It does make the point, though, that the CCC views Eve as a literal person.

To compare Mary to Eve in this vein is also superficial: Adam and Eve were our first parents, and each other's spouse, and both fell into sin. In contrast, Mary is the mother of Jesus Christ. Eve gave birth to the human race, save Adam, but Roman Catholics hold that Mary was a perpetual virgin (par. 499). Yet, however much of an example of faith that she was, she also was a sinner in need of grace. Pope

Innocent III and Cardinal Cajetan from the Reformation era opposed the teaching of the immaculate conception (of Mary), which was first introduced only in the 15th century (it also contradicts even par. 402 of the CCC, which states that one man's [Christ's] act of righteousness leads to acquittal and life for all men). Regarding the supposed 'immaculate conception' of Mary, in Luke 1:47, we read Mary's words: "And my spirit rejoices in God my Savior", meaning that just like everyone else, Mary was a sinner, in need of being saved. 2 Cor. 5:21 also states that "For our sake he made him to be sin who knew no sin, so that in him we might become the righteousness of God", speaking about Jesus Christ. Mary is not mentioned to be without sin in this manner.

The Fall into sin

Central to the Christian Gospel message is the Fall into sin from a state of original righteousness in the Garden of Eden (figure 1). Pars. 374–412 of the CCC cover these facts. For example, the Garden of Eden is mentioned as a historical-geographical place, where the first man was put to till and keep it, and where work was not yet a burden (par. 378), referring back to Genesis 2:15. Man was created good (par. 374), and Adam and Eve, our first parents, mentioned by name, were created in an original state of holiness and truth (par. 375) and until they sinned they did not have to suffer or die (par. 376). Par. 379 describes how original righteousness was lost by the sin of our first parents. If this is so, then this excludes any kind of evolutionary development, which presupposes suffering, pain, death, and extinction. Pars. 385, 388, and 389 summarize this well:

"385: God is infinitely good and all his works are good. Yet no one can escape the experience of suffering or the evils in nature which seem to be linked to the limitations proper to creatures: and above all to the question of moral evil [emphasis added]."

This paragraph refers back to Genesis 1:31, which states that God saw that all He had made was very good:

"388: With the progress of Revelation, the reality of sin is also illuminated. Although to some extent the People of God in the Old Testament had tried to understand the pathos of the human condition in the light of the history of the fall narrated in Genesis, they could not grasp this story's ultimate meaning, which is revealed only in the light of the death and Resurrection of Jesus Christ. We must know Christ as the source of grace in order to know Adam as the source of sin. The Spirit-Paraclete, sent by the risen Christ, came to 'convict the world concerning sin', by revealing him who is its Redeemer [emphasis added]."

"389: The doctrine of original sin is, so to speak, the 'reverse side' of the Good News that Jesus is the



Figure 1. The catechism of the Roman Catholic Church mentions Adam and Eve a number of times as real, historical people. By this, it underscores that the account of creation and the Fall, as described in the book of Genesis, is literally true, despite the convictions of many Roman Catholics.

Saviour of all men, that all need salvation and that salvation is offered to all through Christ. The Church, which has the mind of Christ, knows very well that we cannot tamper with the revelation of original sin without undermining the mystery of Christ [emphasis added]."

Other paragraphs of the CCC which corroborate this idea are pars. 54, 55, and 391.

The consequences of sin on the world

Pars. 397–407 of the CCC give a detailed description of the effects that the Fall had on mankind. Important for this discussion here is par. 400:

"The harmony in which they had found themselves, thanks to original justice, is now destroyed: the control of the soul's spiritual faculties over the body is shattered; the union of man and woman becomes subject to tensions, their relations henceforth marked by lust and domination. Harmony with creation is broken: visible creation has become alien and hostile to man. Because of man, creation is now subject to its 'bondage to decay'. Finally, the consequence explicitly foretold for this disobedience will come true: man will 'return to the ground', for out of it he was taken. Death makes its entrance into human history [emphasis added]."

In this paragraph, we read that death makes its first entry into human history as a heretofore foreign element. Furthermore, all of creation is subject to decay and eventual destruction (Romans 8:19–22). This is why there is pain in child-bearing; this is why labour becomes tiresome, and why the ground is cursed because of man (Genesis 3:16–18), but also why the earth itself is awaiting the liberty of the children of God.

Pars. 406–407 also describe the will of man. The RCC upholds the teaching of free will in these paragraphs. However, the church completely misses the evident consequence of the teaching of the Fall into sin, which it even cites in par. 402: “*Then as one man’s trespass led to condemnation for all men, so one man’s act of righteousness leads to acquittal and life for all men* [emphasis added].” In par. 407 we read: “*Original sin entails ‘captivity under the power of him who thenceforth had the power of death, that is, the devil’* [emphasis added].” If man is spiritually dead, even a captive of the devil (John 8:44–45), then that means he is incapable in and of himself relating to God in any kind of spiritual manner. Man’s Fall is complete and total.

Creation is supernatural and not a random, naturalistic process.

Also important is how the CCC speaks about the way that God created the universe, in pars. 279–314. According to par. 295: “We believe that God created the world according to his wisdom. *It is not the product of any necessity whatever, nor of blind fate or chance* [emphasis added].” Thus, the RCC disavows any kind of random, evolutionary process which gave rise to life from non-life. Furthermore, par. 338 states:

“Nothing exists that does not owe its existence to God the Creator. *The world began when God’s word drew it out of nothingness; all existent beings, all of nature, and all human history are rooted in this primordial event, the very genesis by which the world was constituted and time begun* [emphasis added].”

Furthermore, par. 327 also states:

“The profession of faith of the Fourth Lateran Council (1215) affirms that *God ‘from the beginning of time made at once (simul) out of nothing both orders of creatures, the spiritual and the corporeal, that is, the angelic and the earthly, and then (deinde) the human creature, who as it were shares in both orders, being composed of spirit and body’* [emphasis added].”

This means that human beings, such as Adam, which are spiritual beings (along with angels) were created from the beginning of time, and not after billions of years of evolution.

Moreover, the CCC states (in reference to Genesis 2:1–3), that creation happened in six days, after which God rested from His works:

“345: *The Sabbath—the end of the work of the six days. The sacred text says that ‘on the seventh day God finished his work which he had done’, that the ‘heavens and the earth were finished’, and that God ‘rested’ on this day and sanctified and blessed it* [emphasis added].”

Creation in six days would exclude any kind of evolution. Just as God laboured six days and blessed the seventh day (the Sabbath), so is man also to work for six days and rest in the seventh, according to Exodus 20:8–11.

Summary and conclusion

It is a paradox that many Roman Catholics, including the pope himself as well as Roman Catholic seminaries and higher institutions of teaching, have capitulated to the theory of evolution, yet the CCC aligns with a literal interpretation of Genesis 1–11. Not only does it speak about people such as Adam, Eve, Cain, Abel, and Noah as having really existed, but also talks about the Garden of Eden, the Fall into sin, Noah’s Flood and the Tower of Babel as geographical and historical events. The CCC compares these people to other people from the Bible about whom we have no doubt as to whether they truly existed, such as David, Uriah, Daniel and, above all, Jesus Christ, the last Adam. In par. 345 it also apparently affirms creation in six days. Overall, what the CCC says about creation and the Fall into sin is accurate. We can be grateful that many Roman Catholics generally see clearly in this question, but would urge those who compromise to believe in a literal Genesis.

Endnotes

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Matthew Cserhati has a Ph.D. in biology. He has been an active creationist for 15 years and takes a great interest in molecular biology. He has published a number of articles in *Journal of Creation*. Matthew is currently studying at Greenville Presbyterian Theological Seminary.

Chronology and the Gezer connection—Solomon, Thutmose III, Shishak and Hatshepsut

Anne Habermehl

Solomon's father-in-law is shown to have been 18th-Dynasty Thutmose III, who captured and burned Gezer and presented it to his daughter, Solomon's bride, as a wedding present. The reign of Hatshepsut, aunt/stepmother to Thutmose III, possibly overlapped with Solomon's early reign for a few years (although she was not the Queen of Sheba). Arguments that Shishak was Rameses II are shown to be flawed. A difference of about 470 years between the biblical and secular chronologies at the time of Solomon is therefore postulated. This moves all post-Thutmose III history forward into the first millennium BC.

The subject of correlation of the biblical and secular chronologies is of great importance, not only for determining when events really happened, but especially for biblical apologetics. From this point of view, one of the significant events in history is the destruction of Gezer by the pharaoh who married his daughter to Solomon. This allows us to calculate how far apart the two chronologies are at that time in history, in addition to who Solomon's father-in-law was, who Shishak was, and how Hatshepsut fits in.

Solomon's Egyptian princess bride

In I Kings 3:1 we are told that Solomon married the daughter of the pharaoh of Egypt. In Solomon's time, it was not unusual for two rulers to conclude a treaty between them, with the daughter of one ruler marrying the other ruler to cement the deal.^{1,2} Indeed, it is probable that this is how Solomon acquired many of his other royal wives (I Kings 11:1–3). However, this particular marriage was notable, because it was a pharaoh's daughter who married a ruler outside of Egypt.³

The Bible does not give us the name of this Egyptian princess, not surprisingly, since it doesn't name her father or her mother, either. We do not know whether she was the daughter of the Great Royal Wife of the pharaoh or the daughter of a lesser wife. It is not unusual for us to be in the dark on this because pharaohs' records tended to tell the world a lot about their (glorious) military pursuits, but not much about their domestic arrangements. As a result, historians do not know how many queens/wives/concubines and children most pharaohs actually had. From hints here and there we can assume there were quite a few.⁴ This means that the princess's mother may have been any one of many women in the pharaoh's harem.

The importance of this bride to Solomon is shown by the several mentions of her in Scripture (I Kings 3:1, 7:8, 9:16, 9:24, 11:1; II Chron. 8:11).⁵ Solomon even built the Egyptian princess her own palace (I Kings 7:8); she is the only wife for whom it is stated in Scripture that Solomon did this. Not only that, but the princess's palace was part of Solomon's palace complex, as is clear from I Kings 7:7–12. With the pharaoh of Egypt keeping an eye on how his daughter was treated, we would expect that Solomon would give this princess the very best accommodations. Also, if the normal practices of the day were followed, his bride would have been accompanied from Egypt to her new home by a large retinue of maidservants and menservants, who would have needed housing.⁶

Destruction of Gezer by Solomon's father-in-law

The Bible tells us that an unnamed pharaoh sacked Gezer, a city on the west side of Solomon's kingdom (figure 1):

“For Pharaoh king of Egypt had gone up and captured Gezer and burned it with fire, and killed the Canaanites who lived in the city, and had given it as a dowry to his daughter, Solomon's wife” (I Kings 9:16 NAS).

In the 400 years since the conquest of Canaan by the Children of Israel, the tribe of Ephraim in whose allotment Gezer was located had not been able to destroy it (Judges 1:29). David had not captured Gezer, either. But this pharaoh did, which means that he had a strong military. This opposes the view by some that Solomon's father-in-law must have been a weak pharaoh, because he was willing to marry his daughter off to Solomon.⁷ Instead, we are looking for a powerful pharaoh in our search for Solomon's father-in-law.

History of destructions of Gezer

Like many (if not most) Near Eastern cities, Gezer was repeatedly destroyed and rebuilt.⁸ The question is which of these destructions is the one that was carried out by Solomon's father-in-law, as a lot hangs on making the right choice.

In determining which was the biblical destruction, we might think that it would be easy to get this right. We need merely calculate from our Bible when Solomon reigned, and then check archaeological history to see who destroyed Gezer during this time. That should certainly net us our pharaoh. But clearly it can't be that simple because there are a number of pharaohs claimed by various people as Solomon's father-in-law. In alphabetical order we name a few: Horemheb (Haremheb),⁹ Merneptah,¹⁰ Psieukhannit (Psebkhan) (Psusennes) II,¹¹ Shoshenq I (Sheshonk I),¹² Siamun,¹³ and Thutmose I.¹⁴

Many biblical scholars believe that Pharaoh Siamun caused the Gezer destruction mentioned in the Bible (I Kings 9:16); his regnal dates are c. 978–959 BC (secular).¹⁵ According to this identification, Shishak would be his son, Shoshenq I. This looks good, because the dates seem right; and besides, 'Shishak' and 'Shoshenq' appear to be similar names (if we are not too critical).¹⁶

An earlier destruction of Gezer was carried out by Pharaoh Merneptah, who reigned c. 1213–1203.¹⁷ This destruction by Merneptah makes him a possible candidate for Solomon's father-in-law, as noted by James.¹⁰ That Merneptah actually destroyed Gezer is proven by an inscription on a stela on the Amada temple in Nubia where he lists one of his titles as "plunderer of Gezer".^{18–21} This means that the line on the famous Merneptah stele (discovered at Thebes), "Gezer is captured", refers to himself (Merneptah) doing this. This line does not refer to some previous pharaoh, as surprisingly argued by Clarke²² (the Amada temple inscription in Nubia has been known in the world of archaeology for well over 100 years^{23,24}). Besides, if we think that any pharaoh glorified anyone but himself, we do not know our pharaohs very well!

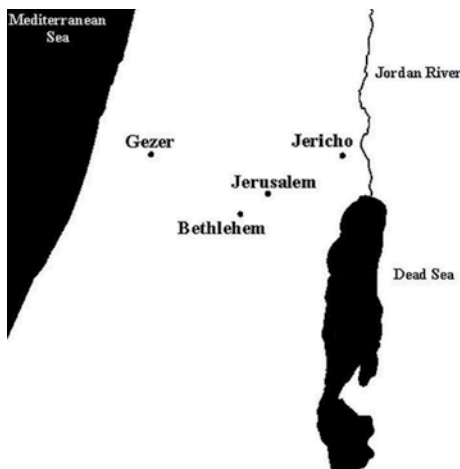


Figure 1. Gezer was located on the western side of Solomon's kingdom. The treaty that Solomon concluded with the Egyptian pharaoh would have given the latter the right to march his armies up and down along the coast on a route between Egypt and points north for his military campaigns. In return, Solomon would have been guaranteed peace.

Historians record an earlier major destruction of Gezer in the mid-second millennium BC (secular) by Thutmose III.^{25,26} This event is usually passed over quickly because secular archaeologists believe that the destruction of Solomon's time was over 450 years later.²⁷ It is this 15th-century BC destruction of Gezer by Thutmose III that we will look at as most likely the one mentioned in the Bible. This leads to consideration of Amenhotep II, his son, as Shishak. Figure 2 shows a famous site at Gezer.²⁸



Figure 2. The High Place at Gezer. This photo shows part of a row of 10 standing stones, some as high as 3 m, located on the north-east side of Tell Gezer. Widely believed to be a Canaanite cultic high place, it dates to just before Thutmose III would have destroyed the city of Gezer and presented it to Solomon and his Egyptian bride as a wedding present. That these stones survived the destructions of Gezer is significant; clearly there was importance attached to this site.²⁸



Figure 3. Thutmose III smiting his enemies, a relief carved on the seventh pylon at the Karnak Temple Complex in Egypt.

What do we know about Thutmose III?

The son of Thutmose II and a secondary wife, Iset (Isis), Thutmose III became pharaoh at only 3–12 years old (historians vary on this) when his father died.²⁹ He himself later claimed that he had been barely weaned at this time.^{30,31} This would make it more likely that his accession was at the lower end of this age spread because the customary age of weaning in pharaonic Egypt was 36 months.³² He therefore ascended the throne somewhere around 1479 BC in the secular timeline, keeping in mind some disagreement on dates.¹⁷ Because of his youth, he was co-regent with his aunt/stepmother Hatshepsut (Great Royal Wife of Thutmose II) for the first 22 years of his 54-year reign, until she died.³³ He therefore became sole regent at 25+ years old. He could have had a daughter of marriageable age already in his early 30s if he was 20 when she was born. These princesses were usually very young when married off to foreign rulers.³⁴

History books say that Thutmose III was one of Egypt's greatest pharaohs,³⁵ and "the greatest warrior pharaoh of the ancient world".³⁶ If we are looking for a powerful pharaoh as Solomon's father-in-law, we need not look further. One important thing that we know about Thutmose III is that he sacked and burned Gezer. The archaeology sources are quite certain about this.³⁷ Figure 3 depicts Thutmose III as a military pharaoh.

What do we know about Pharaoh Shishak from the Bible?

When Jeroboam rebelled against Solomon, he fled to Egypt (I Kings 11:26, 40). Shishak was king of Egypt by that time; Solomon's father-in-law, who preceded Shishak, was dead. Jeroboam stayed in Egypt until Solomon's death and then returned to Israel to be crowned king of the northern kingdom at the assembly at Shechem (I Kings 12:1–3).

Jeroboam's flight to Shishak in Egypt tells us that Solomon's unnamed father-in-law was not the same pharaoh as Shishak. The father-in-law had had a treaty with Solomon, and they had sealed it by Solomon marrying that pharaoh's daughter. Therefore the father-

in-law would not have welcomed Jeroboam, who was not on Solomon's good side, to put it mildly. (In any case, it would make no sense for father-in-law's name to be omitted at his first biblical mention, and then for him to be named only later on.)

Shishak would have welcomed Jeroboam, however, because Jeroboam had a tale about the prophet who predicted that Jeroboam would be king over the northern 10 tribes after Solomon (I Kings 11:26–40). Shishak would have been looking ahead to being in league with Jeroboam after Solomon's death. Shishak and Jeroboam must have gotten along quite well, because the LXX (Septuagint) says that Jeroboam married the sister of Shishak's (Sousakim's) wife while he was in Egypt (LXX 3 Reigns 12:24e). Later, when Shishak came up against Judah in the fifth year of Rehoboam (I Kings 14:25), he left Jeroboam's northern kingdom of Israel alone, as we would expect.

Shishak's campaign against Judah is narrated in 1 Kings 14:25 and 2 Chronicles 12:1–12. Because Rehoboam and his princes humbled themselves, God allowed Shishak to merely take the treasure of Jerusalem and leave, while Rehoboam remained king. As the son of Solomon's father-in-law, Shishak would have been brother or half-brother to the Egyptian princess that Solomon had married. (We do not know whether she was still alive in Jerusalem when Shishak showed up, as the Bible does not mention when she died.)

Amenhotep II: could he be Shishak? Yes

If Thutmose III was Solomon's father-in-law, his son, Amenhotep II, would most likely have been Shishak. Amenhotep II, also called Amenophis II, was co-regent with Thutmose III for about two years. He was 18 when he became sole regent.³⁸

Amenhotep II's last campaign took place in his ninth year; it was largely carried out in Palestine.^{39,40} If this is when he took all the treasure of Jerusalem in the fifth year of Rehoboam, it would mean that Amenhotep II most likely reigned for 4 years before Solomon's death, two years as co-regent with his father and two years as sole regent.⁴¹

If Amenhotep II was Shishak, logically one of the names in his royal titulary should show this.⁴² In fact, one of his names does just that. Let us look at the Nebty (Two Ladies) name of Amenhotep II:⁴³

Nebty Name: "weser fau, sekha em waset."

(Translation: Rich in splendor, who has been made to appear in Thebes.)

At first glance, this name might not look like 'Shishak'. But the Masoretic name 'Shishak' comes originally from Egyptian, then was translated into Hebrew, and then into English. The part in parentheses below is what comes through the linguistic journey:

"we(ser fau sek)ha em waset"

The LXX gives his name as 'Sousakim'. This comes out of the same Nebty name, with a translation trail from Egyptian to Hebrew to Greek to English:

"we(ser fau sekha em) waset"

Explanatory notes:

"The vowel sound 'we' at the beginning got left off both versions.

In both versions, the 'f' got passed over, and the preceding 'r' went with it. (Pre-exilic Hebrew did not have an 'f' sound.⁴⁴)

"The esses are pronounced as 'sh' in Shishak and 's' in Sousakim.

'Waset' is the Egyptian name for the city of Thebes; both the Hebrew and Greek forms of the name have left this part of the Nebty name off."

We see that the Nebty name of Amenhotep II as shown here provides solid evidence that he was Shishak/Sousakim of the Bible.

Chronology difficulties: why it is hard to determine exact dates

We cannot claim precision about the calculated amount of chronology divergence. For one thing, two of the well-known chronology biblical scholars, Jones⁴⁵ and Thiele⁴⁶, do not agree on when exactly Solomon reigned. Even though both are calculating from the Masoretic, there is a difference of

45 years between their dates for the beginning of Solomon's reign; Jones puts this at 1015 BC, and Thiele at 970 BC.⁴⁷

There is also disagreement among secular scholars on when Thutmose III reigned. The most commonly accepted dates for Thutmose III's reign are now 1479–1425 BC (according to what is called the low chronology). But an older high chronology is still preferred by some: 1504–1436.⁴⁸ This makes a difference of 25 years (although this is less than the spread between Jones and Thiele on the biblical side).

Using the year when each king's reign began for comparison, the widest divergence of the two chronologies from these figures is therefore 1504–970 = 534 years (this is the high chronology figure for Thutmose III less Thiele's figure for Solomon). The least divergence is 1479–1015 = 464 (this is the low chronology figure for Thutmose III less Jones' figure for Solomon).

In this paper we will choose the least divergence figure, rounding it off to 470, using the difference between the lower Egyptian chronology and the chronology of Jones.⁴⁹

Correlation of the Exodus with divergence of 470 years at the time of Solomon

The most obvious implication of Thutmose III as Solomon's father-in-law is that this makes the difference between the biblical and secular chronologies about 470 years at the time of Solomon. But the two chronologies only diverge about 350 years at the time of the Exodus, as has been shown.⁵⁰ Why should the divergence be greater later on?

To solve this, we need to look at the period immediately following the Exodus, when Egypt plunged into complete chaos. Secular historians allot about 120–125 years to the 13th and 14th Dynasties, when an unknown number of pharaohs ruled briefly in the period before the Hyksos arrived around 1650 BC (secular).⁵¹ We suggest that immediately after the Exodus Egypt fragmented totally because there was a power vacuum with no pharaoh ruling. For somewhat less than five years the multitude of kings of the 13th and 14th Dynasties ruled mostly concurrently with each other and with Sobekneferu, last pharaoh of the 12th Dynasty. Then the Hyksos entered Egypt and destroyed all these rulers. This would explain the very brief reigns of so many of these kings, and also why Sobekneferu disappeared in less than five years. Secular historians have therefore added about 120 non-existent years immediately after the Exodus because they have laid out all of these pharaohs' reigns end to end rather than concurrently.

One hundred and twenty years just happens to be the difference between 470 and 350. In other words, the divergence of 350 years at the time of the Exodus, plus the 120 extra years inserted afterwards = 470 years' divergence from the time of the Hyksos on. A future paper will look at this chaotic period immediately after the Exodus.

Chronology implications of moving Thutmose III to Solomon's time

These implications are enormous, because anything and anyone that dates after Thutmose III (secular chronology) in the second millennium BC moves to a spot after Solomon (biblical chronology) in the first millennium BC. To give a few examples:

1. All pharaohs who appear after Thutmose III reigned after Solomon. This includes the well-known Ramses II.
2. The Amarna letters written during the reign of Akhenaten (1353–1336 BC) would actually date long after Solomon, not during the period of the Judges, as is commonly believed.
3. 'Solomon's' stables at Megiddo would have been built long after Solomon.

Where exactly in the first millennium BC (with respect to the Egyptian chronology) these will fall is difficult to say. The first part of the first millennium BC is called the Third Intermediate Period of Egypt (1069–664 BC secular), a chaotic time when Egypt was divided, and a number of pharaohs may have been ruling at the same time. A workable chronology of this period has not been developed by scholars because of paucity of information.⁵²

Chronology revision and the design of Solomon's temple

The NIV Archaeological Study Bible claims that there was Phoenician influence in the design of Solomon's temple.⁵³ This should strike us as rather strange, because it was God Himself who gave David the plans for the temple:

"All this, said David, the LORD made me understand in writing by his hand upon me, even all the works of this pattern" (I Chron. 28:19).

We can be certain that God did not draw inspiration for Solomon's temple from the pagan temples of the day! However, we might wonder whether Solomon's temple was so renowned that pagan peoples later built their temples to resemble it.

As an example, the Ain Dara temple near Halab (Aleppo) in Northern Syria, dated to about 1300 BC (secular), is described as similar to Solomon's temple in details of its plan layout, size, style, and decoration.⁵⁴ This would not seem to be mere coincidence. With this chronology revision, the Ain Dara temple would date as much as a couple of centuries later than Solomon's temple.

Hatshepsut: the lady pharaoh who was not the Queen of Sheba

We include discussion of Hatshepsut (aunt/stepmother of Thutmose III) in the Gezer connection because this

chronology revision moves her forward to about the time of Solomon.⁵⁵ This could revive the perennial mistaken notion that she was the Queen of Sheba.⁵⁶ (However, if it were not for the linguistic coincidence that 'Hatshepsut' contains the syllable 'shep', that is similar to 'sheb', she would probably never have been confused with the Queen of Sheba at all.⁵⁷)

We note that because Solomon's royal visitor was called a queen in the Bible (I Kings 10:1; II Chron. 9:1), she could not have been a pharaoh at the time of her visit. The Bible had been calling the rulers of Egypt pharaohs since the time of Abraham (Gen. 12:15). If the Queen of Sheba really was Hatshepsut, this visit would have had to have taken place while she was still the wife of Thutmose II, when she bore the title of a queen, or during the first few years after her husband's death before she took on the title of pharaoh. This presents a problem, because Hatshepsut had already been a pharaoh for quite a few years before Solomon started to reign, as we will show.^{58,59}

To calculate this, we will work backwards from the point in the latter part of Solomon's reign, when Jeroboam fled to Pharaoh Shishak of Egypt (I Kings 11:40). If Shishak reigned four years during the end of Solomon's 40-year reign (as earlier mentioned above), that left 36 earlier years of Solomon's reign. Thutmose III had 32 years as sole ruler after Hatshepsut, but overlapped two years with Shishak in a co-regency, leaving 30 earlier years of his reign. Therefore Thutmose III would have started his sole reign six years after Solomon started to reign. That would leave six years of overlap at the beginning of Solomon's reign with that of Hatshepsut. Because Hatshepsut ruled a total of 22 years, she would have probably reigned about 16 years at the end of David's life, before Solomon became king. However, because of various factors (such as exact reign lengths), and which of Shishak's campaigns the Bible describes, it cannot be stated with absolute certainty how many years the reign of Hatshepsut overlapped with that of Solomon, or whether it did at all.

It is true that the Bible does not mention a lady pharaoh. It does not need to. In Egypt, a pharaoh was a pharaoh. Hatshepsut took on the titulary (names) and regalia of a full pharaoh, and ruled as one. She did a good job, too. Nobody says anything to the contrary.⁶⁰

The real Queen of Sheba/Saba

This queen came to see Solomon (I Kings 10:1–13; II Chronicles 9:1–12) after he had been reigning for at least 24 years.⁶¹ She travelled from the south, as Jesus said (Matt. 12:42; Luke 11:31), which is where the kingdom of Sheba/Saba was located in Yemen.⁶² (We will discount legends that she and Solomon had a son who ruled in Ethiopia.⁶³) The

real Queen of Sheba had to have lived in the 15th century BC (secular), at the time of Thutmose III. This means that this southern kingdom has earlier origins than is generally believed.⁶⁴ Archaeological evidence of early dams and canals for irrigation in the Wadi Dhana near Marib, the ancient capital of Saba, goes back as far as the early third millennium BC (secular).⁶⁵ This shows that there was an active and prosperous kingdom there in antiquity.

The 'Gezer effect' on the Babylonian and Assyrian chronologies

It is well known in historical circles that the chronology of the entire Ancient East is based on the standard Egyptian chronology.⁶⁶ It therefore follows that if we reduce the secular Egyptian-based chronology of the second millennium BC by several hundred years, we will have to reduce the Babylonian and Assyrian timelines by the same amount overall. This will affect which rulers and events in those countries correlate to those in the Bible. How the Babylonian and Assyrian timelines will be shortened is beyond the scope of this paper. An example of major work on this topic is the book by Bernard Newgrosh.⁶⁷

Some remarks about Velikovsky

The logic used in this paper to revise the standard secular Egyptian chronology downward at the time of Solomon by approximately 470 years was independently determined by my own research. No arguments are used from the work of the late Immanuel Velikovsky, who first introduced the idea of divergence of the secular and biblical chronologies.⁵⁵ As it happens, Velikovsky had come to a similar conclusion to mine with respect to the two chronologies, although with some differences in the details. For instance, he thought that Thutmose III was Shishak,⁶⁸ and, as noted previously, that Pharaoh Hatshepsut was the Queen of Sheba.

We mention this here because of the great amount of hostility that has been directed at Velikovsky over the years. This goes on even today, including repeated anti-Velikovsky comments in the pages of this journal.⁶⁹ Overall, Velikovsky's chronology conclusions are solid, and he did a great service to biblical apologetics in his seminal work. The maligning of Velikovsky's chronology is unwarranted.

Concluding remarks: importance of the Gezer destruction in correlating the biblical and secular chronologies

One of the things that comes up repeatedly in revision of the secular Egyptian-based chronology is that various

people have been working on it for years, and they differ in their respective versions. This understandably makes the subject confusing to anyone who would like to determine what the divergence of the secular and biblical chronologies really is.⁷⁰

It cannot be emphasized too strongly that the pegs on which chronology arguments are hung must be firmly nailed to the wall. In other words, those arguments must be solid, and cannot be based on suppositions or what we might call 'special pleading'. This is why the destruction of Gezer is so important. It is the one certain thing that we know about Solomon's father-in-law. What some revisionists are doing, however, is first attempting to determine who Shishak is, and then going back to see who might be the father-in-law pharaoh. They wave their hands airily (so to speak) and say that a certain pharaoh made campaigns in the direction of Canaan, and therefore he possibly could have destroyed Gezer.⁷¹ They mistakenly deny that Merneptah sacked Gezer (e.g. Clarke²²) when, in fact, he provably did.¹⁹

Indeed, those who believe that Rameses II was Shishak resort to claiming that 'Shishak' was a form of Rameses' hypocoristicon (nickname), 'Sessy', or similar forms (they do not explain the 'k' on the end, or the 'Sousakim' form of the LXX).⁷² Nor do they mention how rarely this form occurs.⁷³ We are supposed to believe that our Scripture would use a rare nickname in referring to this pharaoh. The claim that Rameses II was Shishak has been around since Rohl published his *New Chronology* in 1995;⁹ Rohl's extended arguments include some weak points, and this is one of them. Another is Rohl's claim that Rameses II plundered Jerusalem (Rameses' inscription says 'Shalem') in his eighth year.⁷⁴ This is unlikely because there was an ancient city named Shalem (Salem/Salim) in the north of Israel, and this would have most likely been the actual city that he plundered.⁷⁵

Does it matter who Solomon's father-in-law and Shishak were? Yes it does, because by determining who they were we are establishing a connecting bridge between the biblical and secular chronologies, and we are determining how far secular historical events will need to move forward in time. We might be amused when secular scholars argue about 10 or 20 years here or there in their standard secular chronology;⁷⁶ we are meddling with this chronology on the order of hundreds of years.

Getting the chronology right has huge importance in biblical apologetics. The root of nearly all unbelief in the biblical narratives is that historians and archaeologists cannot find evidences of the Exodus, the conquest of Jericho, David and Solomon—whatever—at the time where they are looking for it. When we get the chronology right, we will have a powerful tool at our disposal.

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- 6 See Podany, ref. 1, p. 196. A Mittanian princess was accompanied by 317 retainers to her new home in Egypt as a bride of Amenhotep III.
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- 9 Rohl, D.M., *A Test of Time*, Century, London, published in the US as *Pharaohs and Kings*, pp. 181–185, 1995. Rohl says that Haremheb might have conquered Gezer while he was commander of forces for Tutankhamun, because he didn't do it later on while pharaoh. This is not what the Bible says, which is that it was the pharaoh of Egypt who captured Gezer. However, Rohl considers himself an agnostic, and does not place the authority of the Bible above his researches (see p. 295 in Mahoney, T.P., *Patterns of Evidence: Exodus*, Thinking Man Media, St. Louis Park, MN, 2015). Because of the prominence that Rohl is given in revision of the Egyptian timeline, Bible-believing Christians need to beware of his work.
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Anne Habermehl has been interested in creationism and biblical apologetics since her teens. She has published on topics such as the Egyptian timeline, the search for Noah's Ark, the location of the Tower of Babel, the placement of the Ice Age in history, and who the Neandertals were. Born in Canada, she has a B.Sc. from the University of Waterloo (chemistry). She now lives in the US.

Roman Catholic confusion on creation

Benno Zuiddam

The Roman Catholic Church reflects a tension between its traditional teachings and the current views of its leadership. While many bishops and nearly all Catholic universities promote evolution, historical creation remains the official doctrine of the church.

The Roman Catholic Church and its governance are sometimes difficult for Protestant Christians to understand. Even among Roman Catholics, confusion and misconceptions prevail on the subject of creation.

Encouraged by Roman Catholic academia and most bishops, many prominent Catholics happily assert that their church embraces evolution, while traditional Catholics remind them that not even the pope can change a defined ‘doctrine of faith’, including the church’s traditional doctrines regarding the historical truth of Genesis 1–11. This includes the original holiness of Adam and Eve and the doctrine of Original Sin.

Traditional Catholics who study the history of the Catholic Church know that there have been prior occasions on which popes, like Pope Honorius in the seventh century, failed to uphold ‘teachings’ already defined and thus allowed error to spread. They point out that the doctrine of ‘papal infallibility’ as defined by the First Vatican Council (1869–1870) specifies that God protects the pope from error only when he defines a doctrine of faith or morals as being contained in the ‘Deposit of Faith’; and not when he teaches ‘new doctrine’.

Non-Catholics whose information about Roman Catholic Church affairs reaches them through the mass media, or even through ‘official’ Vatican press releases, have every reason to think that the pope and most of the bishops have the power and the intention to change the traditional doctrine and practice of the Catholic Church, especially in relation to the doctrine of creation. However, the fact that the pope and many of his advisors may indeed *intend* to accomplish such a revolution does not mean that they actually have the *power* to do so.

As confusion reigns, the *Reformed Daily*, a conservative Protestant newspaper in the Netherlands, asked me to correct some of these views.¹ In this contribution to *Journal of Creation* I will try to shed some light on these issues in a more substantial way for evangelical Christians. I will do this by first examining some of the recent events touted by the mass media in support of a revolutionary view of the contemporary papacy, before putting them into proper perspective in the light of doctrines previously defined by the Catholic Church at the highest levels of authority.

Creation suppressed

When the Pontifical Academy of Sciences organised an international conference on creation and evolution in 2009, it decided specifically not to invite any scientists who supported creation or Intelligent Design (ID).² Free enquiry was not part of the agenda. The only creationist present was a multi-faith invitee. Once the organisation discovered that this Turkish Muslim professor was a creationist who dared to speak out against evolution, his microphone was turned off.³ This was under the relatively conservative Pope Benedict, who was said to be sympathetic to ID but did not have the power to invite any like-minded scholars to his own conference on creation and evolution; it is feared that the situation has not improved since. Indeed, with the recent suppression of the seminary of the Friars of the Immaculata in Rome,⁴ the last bastion of traditional creation theology was shut down and theistic evolution has become the virtually undisputed academic orthodoxy in the Roman Catholic seminaries and universities.

Genesis at parish level

Whilst the present discrimination of the Vatican against traditional theologians and scholars is very real,⁵ there are other factors that contribute to the confusion as well. Catholic schools and universities are a substantial problem in this respect, as most have at best a token identity and are Catholic in name only. While the senior clergy and teachers actively promote Darwinism, Catholic education in general has embraced evolution.⁶ With notable exceptions among the Catholic episcopate, it is generally only at the family and parish level that priests and individual believers object to this and embrace a traditional and biblical view of creation.

However their number is substantial. According to last year’s Gallup Poll, nearly 40% of all American Catholics believe in a biblical creation less than 10,000 years ago and accept the historicity of Adam and the worldwide Flood as described in Genesis.⁷ This also explains why, although teaching evolution in Catholic institutions is the rule, it is still controversial among traditional religious communities and in Catholic circles at the parish level. Responsible positions in



Image: Benno Zuidam

Figure 1. St Peter's Church in Rome, the centre of Roman Catholicism

Catholic education and senior clergy appointments, certainly in the Western world, are filled with those who have either embraced evolution personally or are unwilling to speak out against it publicly. So, while two out of every five Catholics in the USA holds fast to traditional biblical creation, most of the bishops, as well as those who run its education, either ignore and exclude creationist views or actively work and teach against these.

Presumably the 37% of Catholics who believe in what the Catechism of the Council of Trent called 'the sacred history of Genesis' are likely to be a far larger percentage of believers who attend church on a regular basis and give financial support at a local level. As most professing Catholics are non-practising, those who do find biblical convictions important are likely to be largely found among church-going Catholics. They find themselves in a situation in which Catholic institutions no longer actively uphold traditional Catholic faith and practice. Thus, it is helpful for evangelical Christians to realize that despite the statements of recent popes and bishops, there are many Catholics who hold the traditional biblical belief in the literal historical truth of the first 11 chapters of the Book of Genesis. While they are traditionally loyal to the hierarchy, they nonetheless find themselves in a situation where many important positions in their church, as well as in Catholic media and education, have been hijacked by those with a different agenda.

Media agenda

As mentioned above, another important factor that contributes to the confusion about the actual teachings of the Roman Catholic Church is the mass media. The promotion of evolution as the accepted Catholic view is often

media-induced. This is not only due to a secular press which seeks sensationalism. It is also actively promoted by Catholic-run media, traditionally initiatives of the Jesuit order.

The moment Pope Francis says something along progressive lines, his words are blown out of proportion to create momentum and political pressure. When Francis proclaimed in 2014 that the 'big bang' and evolution harmonize with biblical creation, this produced sensational headlines about the pope ending up in the camp of the evolutionists.⁸

In reality, Francis did not say anything different than what his two predecessors had already stated publicly. More to the point, he actually made out a case for ID without mentioning the name, because the goal-orientated evolution that the pope spoke about does not exist in a scientific sense.⁹ But on this the mass media kept silent. They like to use this pope for their own agenda.

Official doctrine

In understanding the Roman Catholic Church it is helpful to realize that there is a significant distinction between one's private or personal convictions and one's official views as a representative of the organisation. Its doctrine of 'papal infallibility' does not mean that whatever a pope proclaims is right. A pope cannot invent new doctrine. Even for doctrines that he promulgates *ex cathedra* ('full authority') to be considered valid two conditions must be met. First, such teachings need to be in agreement with the Scriptures, and second, they must have confirmation in apostolic tradition. The latter is, as a rule, indicated by unanimity among the early Church Fathers. Only then does a papal proclamation form part of the magisterial,¹⁰ or official, teaching of the Catholic Church.

Just as Protestant ministers may at times doubt the official teachings of their denomination, popes and bishops do not always have sufficient faith in the doctrines or moral teachings of the church they represent. Out of regard for their responsible office, good bishops and popes will be careful not to express their doubts or disagreements with the teachings of the church in an official capacity. This is why the Catholics distinguish between personal opinions of a pope and official pronouncements that he makes.

For this reason Benedict XVI was usually quite diplomatic in his choice of words and emphasized regularly that evolution was a hypothesis and a pragmatic theory for testable phenomena. Pope Francis also has a similarly reticent approach in his official letters. For example, in *Laudato Si* (24 May 2015, par. 81) he says: “Human beings, even if we postulate a process of evolution, also possess a uniqueness which cannot be fully explained by the evolution of other open systems.” In other words, the pope in his official teaching is careful not to deny the official doctrine of the church. Which pope would like to be seen committing something he knows to be qualified as ‘mortal sin’ by the prior magisterium of the church? Neither Benedict nor Francis has thought it wise to give passing metaphysical scientific theories the status of fact or dogma.

For Catholics, the pope is only authoritative when he speaks as the official representative of Christ, when he defines a doctrine as part of the Deposit of Faith. Acknowledging the historical character of the first chapters of the Bible is part of this official doctrine of the Catholic Church. In other words, doctrinally and principally the Catholic Church is committed to biblical creation. Other views are permissible, but these must meet minimal doctrinal criteria.

The most comprehensive recent authoritative document on creation was prepared by the Pontifical Bible Commission (PBC) and proclaimed by Pius X in 1909: *De Charactere Historico* (On the historical character of the first chapters of Genesis).¹¹ Together with relevant parts of *Humani Generis* (12 August 1950) this document represents the definitive teachings of the church on the doctrine of creation. It also contains a firm rejection of Darwinism. Any Catholic who openly doubts these teachings is, by an authoritative papal declaration, guilty of *culpa gravi*, or mortal sin (*Praeantia Scripturae*, 18 November 1907). Whatever the prevailing views at Catholic schools and seminaries might be presently, this remains the official doctrine of the church.

Historical account

Following the Church Fathers and Councils, the Catholic Church teaches that the first three chapters of Genesis have a literal and historical meaning. Mythologizing of the history of Genesis is expressly rejected. More specifically, any Catholic is obliged to believe as history: the immediate creation of man, the formation of Eve from Adam and a literal interpretation of mankind’s fall into sin, the role of the serpent included. Bible interpreters, however, are free as to their interpretation of the word ‘day’ in Genesis. Both the proper sense of the text (*sensu proprio*) and a non-literal interpretation (*sensu improprio*) are allowed, provided that the historical requirements mentioned earlier are met.¹² The PBC established that the Church Fathers

are more or less unanimous in their literal interpretation of Genesis 1–3 as historical events. If they deviate from this at all, as St Augustine did in regard to the meaning of ‘day’ in Genesis 1, it is not in Darwin’s direction. On the contrary, Augustine proposed an immediate creation of everything in principle, shorter than six day-night cycles. All Fathers were ‘creationists’ and believed in a young earth of less than 6,000 years at the time; including Augustine. These views were confirmed by the Fourth Lateran Council (AD 1215). The greatest scholar of the Middle Ages, Thomas Aquinas, specifically taught that the creation days in Genesis 1 were normal days.

As the doctrine of creation concerns revealed truth—even Moses did not have human eyewitnesses available when he described the Genesis account—teachings on creation are largely dependent on the authority of Scripture. The acceptance of evolution in Catholic circles coincided with a departure from papal doctrine on the Bible as the historically reliable Word of God. While Pius XII seemed more flexible on the doctrine of creation than his predecessors, the public shift of the Vatican towards evolution only started under Pope John Paul II.

In a lecture for the Papal Academy of Science (22 October 1996) he spoke positive words about evolution as ‘more than a hypothesis’. Also at the time, newspaper headlines followed, including ‘Pope believes in evolution’.¹³ Catholic media like EWTN were quick to explain that the wording of the speech did not endorse biological evolution. What is profoundly mystifying though, is that John Paul’s famous lecture most likely never took place, despite the countless international news reports to the contrary.¹⁴ The text of the speech was, most likely, forwarded to the media without the pope ever seeing or signing it. The press release also bypassed the pope’s right-hand man who was responsible for approving its contents. It is reported that members of the Pontifical Academy for Science received a copy without the pope’s usual signature. The media coup outmanoeuvred the small circle of John Paul II loyalists in the Vatican who took an interest in publicly preserving the teachings of the magisterium on Genesis. They were placed before a *fait accompli*. A combination of embarrassment and the liberal personal views of John Paul II kept him from public disclosure and correction of this affair, particularly as the speech had received the highest praise by almost all media outlets in the world.

Pressures

There is a background to the praise for evolution by the last three popes. The shady events surrounding the controversial John Paul II speech, as well as the 2009 Vatican congress that specifically excluded scientists who believed in

the traditional doctrine of the Catholic Church, is indicative of a politicized climate that does not shrink back from shady measures to promote its causes. Both Benedict and John Paul functioned under tremendous pressure, especially from the Jesuit order, which is not only the largest religious order, but also the one most involved in and responsible for Catholic education. In the 20th century they took a leading role, both in media and education, in actively promoting historical criticism in biblical studies and Darwinism in science.

Georges Lemaître, the brilliant Belgian physicist who proposed the idea that was popularized as the ‘big bang’, was educated in a Jesuit school; and an influential Jesuit evolutionist was Pierre Teilhard de Chardin. His thinking shows that the adoption of neo-Darwinism isn’t merely about the historicity of one or two chapters in the Bible, but inevitably leads to the denial of core biblical truths. As a result of his commitment to evolution, Teilhard de Chardin abandoned the dogma of original sin. If there was sin and death before Adam’s fall and God used these to make all men, there really is no other option theologically.

Affirmation of creation

Still, the Catholic Church did not waver and the standards of the PBC remained the official doctrine. This became clear in 1948 when French Cardinal Suhard tried to make the PBC withdraw its promulgated teachings on Genesis and evolution. The Vatican denied his request and confirmed that these teachings were clear and valid so that nothing beyond these was required. For this reason, *Humani Generis*—which appeared shortly afterwards and which allows Catholic scholars not to believe or to teach evolution but to examine

it as a hypothesis—should be read in the light of the PBC decrees of 1909.

There is also good theological reason for the magisterium not to endorse theistic evolution, as the theory does not sit well with several core doctrines of the church. It does not meet the requirements of the PBC and is far too problematic in most respects to be classified as an exception in terms of *De Charactere Historico*. The context of this document rules this out, because it was the perceived heresy of Darwinism that gave rise to the pronouncements of the PBC on Genesis in the first place.

This, however, pales into insignificance if the larger doctrinal implications of neo-Darwinism are considered: the doctrine of God (death and sin as creation tools); the doctrine of man (death and sin were part of original creation and ultimately mankind cannot be held responsible); the doctrine of sin (no inherited sin and responsibility of first Adam); the doctrine of salvation (Christ coming to save the world from a condition for which God and not mankind was responsible). Billions of years of suffering resulting in the rise of man is a far cry from God’s reflections in Genesis 1, or even from the conditional mortality that some Church Fathers proposed.

Perhaps it is no coincidence that Pope John Paul II advanced the view that any conceived life would ultimately be saved. If evolution were true, it should not be otherwise or God would be profoundly unjust. At best God infuses souls into wretched humanoids who have to make a start in a world that has been subjected to a cosmic curse from the very beginning with a fallible body and mind to match. Man had no chance whatsoever to begin with. Theologically this cruel experiment is hard to reconcile with a loving Father who creates the world through the author of the Sermon on the Mount.

The Gnostics and Marcion already realized that one’s view of creation has implications. Christ as agent of creation (John, Colossians) cannot present different values than the Incarnate Word and the Master of the Gospels. For the early heretical groups just mentioned this resulted in a separation between the material and spiritual world. In today’s terms, they ceded the material world to Darwinism and claimed the soul for the Lord. Not only is this view of



Image: Benno Zuiddam

Figure 2. Dark clouds may be looming over Rome, but creation remains its official doctrine

God essentially pagan, it also requires a redefinition of the doctrine of Scripture.¹⁵

Conclusion

In sum, the fathers and councils, from Lateran IV to Vatican I, propagated a good creation and the historicity of the events described in Genesis 1–3, including a historical fall of the first two parents of all humanity with cosmic implications. It is unlikely that the traditional doctrine of creation described above will be revisited by present or future popes. The teachings of the Catholic Church have been constant and unequivocal for the duration of its existence and are based on the best philological interpretation of Scripture. Added to this is the unanimous view of the fathers as a rule for the interpretation of Scripture laid down by two authoritative councils, Trent (1545–1563) and Vatican I (1869–1870).

This implies that any innovation in regard to the doctrine of creation will necessarily sabotage the Catholic faith and cause the Catholic Church to depart from its traditional identity. Then there are additional clear statements of the magisterium in the decrees of several ecumenical councils and authoritative papal declarations. For instance, a solemn warning and declaration by Vatican I against the proposition that ‘the progress of science’ could justify changing the doctrine of creation as defined by the Catholic Church, excluded, and for a long time prevented, any future acceptance of evolution.

In other words, the traditional doctrine of creation cannot be abandoned, unless the church leadership officially renounces the immutability of dogma as an essential characteristic of the magisterium—and ceases to be Catholic.

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10. From the Latin *magisterium*.
11. *De caractere historico trium priorum capitum Geneseos* (Concerning the historical nature of the first three chapters of Genesis), p. 567–569, 30 June 1909 [AAS 1]. The original Latin may be consulted at: vatican.va/roman_curia/congregations/cfaith/pcb_doc_index.html.
12. However, a literal interpretation is preferred. The context of the 1909 decrees places the burden of proof squarely on the shoulders of exegetes who deny the literal and obvious sense of any part of the text of Genesis 1–3, including the meaning of “yom” (יֹם) or “dies” in Genesis 1.
13. The full text of John Paul II's speech may be retrieved at: ewtn.com/library/papaldoc/jp961022.html.
14. See Zuiddam, B.A., Did modernist Lobby pressure Pope JP2 into pro-evolution speech that he never gave or signed?: zuiddam.wordpress.com/2017/10/12/did-modernist-lobby-pressure-pope-jp2-into-pro-evolution-speech-that-he-never-gave-or-signed/.
15. If there is a god in Darwinism, he is not unlike the old Gnostic Demiurge, irreconcilable with Christian values. Marcion and other Gnostics therefore removed large portions from the Bible as non-authoritative, or denied their historical character.

Benno Alexander Zuiddam D.Th. (church history) Ph.D. (Greek) studied at four universities in Europe and South Africa. He is research professor (extraordinary associate) with the Faculty of Theology of North West University, Potchefstroom, South Africa. He also serves with Greenwich School of Theology (UK) and the Centre for Patristic Research (Free University Amsterdam/University Tilburg). Prof. Zuiddam has published in a great variety of peer-reviewed journals, including international publications in the fields of Greek and Old Testament Studies. He also authored an in-depth study on the authority of the Scriptures in the early church, as well as an introduction to the history of the Western Church. His research focuses on divine revelation in early Christian and biblical literature and the Greco-Roman world, but he also takes a professional interest in theological liberalism, particularly in the 19th century. In 2014 Prof. Zuiddam was elected member of the South African Academy for Science and Art.

Developmental gene regulatory networks—an insurmountable impediment to evolution

Jeffrey P. Tomkins and Jerry Bergman

Macroevolution requires that new developmental adaptations arise via random mutations that somehow provide a novel advantageous selectable trait. Developmental genetics research has documented that at the initial hierarchical levels of gene expression, it is nearly impossible to beneficially change the overall program by even single gene mutations without causing a major catastrophe. Another important aspect of the developmental genetics paradigm is the paradox of conserved protein sequence among top-level transcription factors combined with mutation intolerance. Extreme sequence conservation would seem to support common descent yet lack of mutability negates the fundamental mechanism of evolutionary change. In contrast, an Intelligent Design model predicts common code serving a general purpose in unrelated engineered systems.

Initial animal embryo cells are genetically identical and pre-packaged by the mother with maternal RNA, ribosomes, and proteins, which control the establishment of the body plan in the offspring embryo.^{1–3} As the cells continue to divide over the process of embryogenesis, they are converted into different cell types, eventually resulting in skin, muscle, bone, connective tissues, nerve cells, etc, in a process called differentiation.

Embryogenesis was first experimentally investigated in the 19th century because of its fundamental importance to all of biology. Recent reviews show that the oocyte is polarized via a complex and redundant system of interactions between the cytoskeleton, several signalling pathways, and cell-to-cell communication. These issues are also of intense interest to assisted reproductive research and the assessment of embryo quality. Precisely when and how the cells of the mammalian embryo become committed to a specific cell type is of intense interest to stem cell researchers with evidence that it occurs as early as the 2 or 4 cell stage.^{1–4}

Each differentiated cell employs specific parts of its genome, namely those genes and regulatory regions that are necessary to construct each specific cell type required by the developing embryo. Genes and regions of the genome that are not required at any stage of development are blocked by repressive chromatin states associated with DNA methylation and histone modifications.⁵

A complex control system exists which causes the embryonic cells to differentiate so that the appropriate body parts and organs will develop at the proper location in the developing body at the required time. This system must operate at a high level of control to insure the zygote develops into a complete functional organism consisting of many billions of differentiated cells that develop into

functional organs and organ systems. The fates of individual cells and lineages are determined by a variety of genetic systems involving transcription factors, gene regulatory features (promoters, enhancers, and silencers), chromatin-modifying non-coding RNAs, as well as cytosine and histone modifications that accurately mark and dynamically designate its state in the developmental continuum.^{6–8}

Many gene products, including proteins and a diversity of non-coding RNAs, are required for the development of a specific animal body plan and its many structures and organs. These gene products transmit information that influences how and when individual cells differentiate. These signals must interact with each other during embryological development in order to regulate both how cells and tissues are organized and assembled. The cell's many types of signalling molecules, such as hormones and cytokines, also coordinate and influence this cellular development. They form networks of coordinated systems that interact in ways analogous to how computer systems are designed to achieve the functional complexity of integrated circuits, hardware, and software required.⁸

When and how cell signalling molecules are transmitted often depends both on what signals from other molecules are received, and when they are received. This system, in turn affects the transmission of yet other signals—all of which must be properly integrated and coordinated in order to achieve the numerous specific time-critical functions required for organism development from a zygote to an adult.

Such organism and organelle specific genetic circuitry also guides the process of biomineralization resulting in skeletons and teeth as well as the generation of turtle and clam shells.⁹ The coordination and integration of a plethora of signalling molecules ensure that the proper cellular differentiation

and organization of distinct cell types occurs during the development of a specific animal body plan, such as that of a mammal or insect.

The gene regulatory network model

The current approach to understanding developmental biology incorporates concepts of systems biology and centres around the idea that developmental gene regulatory networks (dGRNs) control the ontogeny of the body plan. In this paradigm, dGRNs are made up of transcription factors and regulatory modules (e.g. enhancers) that control the spatial and temporal expression of genes.^{10–14} In reality, signalling pathways within and between cells serve as links between subcircuits in dGRNs.¹⁰ Epigenetic mechanisms that modify chromatin structure and regulate gene expression are also directly involved in controlling dGRN activity as well.^{6,7} In modelling these unfathomably complex systems, the secular scientific community typically only defines dGRNs as consisting of transcription factors and their regulatory modules.^{10,13,14}

The pioneering researchers in the area of dGRNs were two now-deceased scientists at the California Institute of Technology—Eric Davidson and Roy Britten. Their work on gene regulatory networks was paradigm-shifting with tremendous impact in many different fields of biology. Their novel ideas were originally put forth in several theoretical papers between 1969 and 1971.^{15–17} To explain development in multi-cellular organisms, they formulated a theory that proposed a model of developmental gene control by regulatory sequence found in the regions of the genome containing high copy DNA based on early observations of DNA sequence complexity in studies of reassociation kinetics. It was assumed that the genetic content was contained in low copy sequences that were surrounded in a sea of moderate to highly repetitive sequences. Thus, the logical conclusion was that the more highly repetitive sequences formed a controlling genetic matrix governing the protein-coding genes during development.

After these early years, Davidson and others went on to more fully elucidate the nature of dGRNs using the modern tools of molecular biology and eventually genomics with many exciting advances coming in the first decade of the 21st century.

The general idea that has emerged from the most recent studies of dGRNs in a variety of model organisms is that the dGRN is hierarchical in structure and can be thought of in a very simplified manner by considering transcription factors (TFs) to be nodes.^{14,18} The dGRN is then composed of three sequential layers or categories of nodes as depicted in figure 1. The TFs at the most top levels (kernels) are general activators and involved in initiating overall regulatory

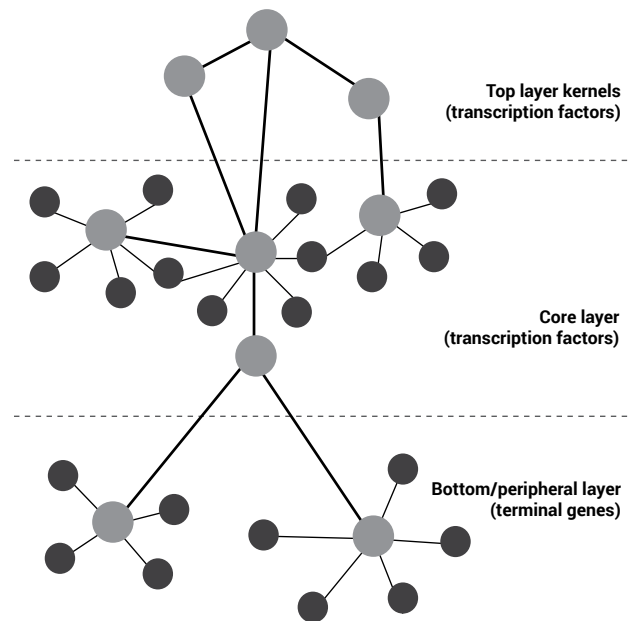


Figure 1. A simplified hierarchical schematic of a dGRN. The large grey nodes represent transcription factors (TFs) and their targets are represented by small grey nodes. The links (lines) represent the regulation of target genes by TFs. Links between the TFs are in bold. TFs typically regulate multiple target genes and themselves can be regulated by multiple TFs. Nodes with many links are often called hubs. The three tiers attempt to convey the hierarchical concepts of dGRNs described in the text. The top-level kernel TFs affect most other modules in the network and are typically associated with initiating subcircuits and cascades. The lowest layer contains genes downstream at the terminal end of a cascade which typically function more specifically in differentiation and also tend to be those specifically involved in phenotypic variability.

cascades. The TFs that comprise the middle nodes coordinate the transcription of many genes in combination with other TFs and would largely be involved with the activation or repression of genes related to growth, cell migration, shape, adhesion, and elasticity. The nodes at the lowest or outermost levels are considered to be at the periphery and would typically be indicative of the downstream developmental differentiation and much of the phenotypic variation we see among plant and animal kinds. For example, in humans, genetic variability in peripheral nodes would relate to skin colour, eye colour, height, hair-related traits, etc.

In general, the TFs associated with the upper nodes tend to be more highly similar in protein sequence among different taxa than those on the periphery. In addition, the general toolkit of upper-level TFs (give or take a few) in any given organism can be found at the most allegedly basal positions in the alleged evolutionary tree of life.^{19,20} Thus, the information complexity of this system and its most basic components appeared suddenly in the scheme of life, and according

to evolutionists was responsible for the amazing burst of body plans and creatures found in the so-called Cambrian explosion.^{21–23}

However, this sequence similarity or conservation among TFs from top-kernel-level nodes across the spectrum of life offers little consolation to the evolutionist. The chief problem for evolution is that TFs at both top and middle-level nodes are highly resistant to mutation or perturbation of their expression. Because of extensive hierarchical interconnectivity, if a change occurs in a TF that patterns the embryo, the alteration affects all of the downstream connections resulting in major developmental problems and is universally fatal. While the extreme sequence conservation of these proteins may seem to support the notion of macroevolutionary common descent, because the early phases of development depend so critically on the establishment of specific expression patterns, very little alteration is tolerated.

It is also interesting to note that evolutionary developmental biologists use the same terminology as used to describe man-made engineered computer systems, but deny that they were intelligently designed. The following is an excerpt from a recent 2017 review in which the author states:

“We suggested that GRNs comprised four different components: (1) recursively wired subcircuits of genes responsible for patterning parts of the developing embryo, which we described as kernels; (2) small subcircuits that are easily co-opted to form particular developmental roles (such as Notch), which we termed ‘plug-ins’; (3) switches which activated or deactivated particular subcircuits, which acted as input/output (I/O) switches in the GRN; and (4) the downstream differentiation gene batteries.”²⁴

The recursively wired kernels in the dGRN elegantly and sequentially define the spatial domains of specific regions in the developing embryo. Amazingly, while the subcircuits of specific gene sets are not reused elsewhere in the development program, the individual kernel-level genes themselves are ingeniously deployed again for other tasks. And in opposition to evolutionary theory, once the pathway is established early in development, the entire system is stubbornly resilient to mutational change. Extensive research on the developmental circuits of the sea urchin has documented how tightly controlled and orderly this process is, and “disarming any one of these subcircuits produces some development abnormalities.”²⁵ Developmental sequences, once traversed, are locked down so they do not change at any later time. Embryos require embryo-specific control systems, and adults require adult-specific control systems.

Building new designs by mutations

To construct a fundamentally new animal design from a pre-existing design by mutations and selection requires numerous major alterations of the pre-existing developmental gene regulatory network that is established in a very early zygote stage. Furthermore, the research of developmental biologists has shown that constructing a new animal design would require thousands of coordinated mutations, yet even the slightest alteration in one or a few genes or their regulatory sequences inevitably produces catastrophic consequences.

As Davidson has documented, a dGRN that regulates body-plan development “is very impervious to change” and usually leads to “catastrophic loss of the body part or loss of viability altogether”.¹² This observable consequence virtually always occurs if even one dGRN subcircuit is interrupted. Because most of these changes are always “catastrophically bad, flexibility is minimal, and since the subcircuits are all interconnected ... there is only one way for things to work. And indeed the embryos of each species can develop in only one way.”¹²

In his book, Intelligent Design proponent Stephen Meyer noted that “Davidson’s work highlights a profound contradiction between the neo-Darwinian account of how new animal body plans are built and one of the most basic principles of engineering—the principle of constraints.”²⁶

As a result, “the more functionally integrated a system is, the more difficult it is to change any part of it without damaging or destroying the system as a whole”.²⁶ Because this system of gene regulation controls animal-body-plan development in such an exquisitely integrated fashion, any significant alterations in its gene regulatory networks inevitably damage or destroy the developing animal. This now-proven fact creates critical problems for the evolution of new animal body plans and the new dGRNs necessary to produce them, preventing gradual evolution via mutation and selection from a pre-existing body plan and set of dGRNs.

Developmental biologists openly recognize these clear problems for the standard evolutionary synthesis. The problem as elaborated by Davidson, noted that neo-Darwinian evolution erroneously assumes that all microevolutionary processes equate to macroevolutionary mechanisms, thus producing the false conclusion that the “evolution of enzymes or flower colors can be used as current proxies for study of evolution of the body plan”.¹² Typical evolutionary research programs involve studying genetic variation within a species or genus involving inter-fertile natural populations or populations from controlled crosses. From a developmental systems biology perspective, the genes or regulatory features involved in such variability lie at the peripheral nodes and do not explain novel body plans associated with macroevolution. Davidson notes that the standard evolutionary synthesis

“erroneously assumes that change in protein-coding sequence is the basic cause of change in [the] developmental program; and it [also] erroneously assumes that evolutionary change in body-plan morphology occurs by a continuous process”.¹² Davidson also aptly notes that “these assumptions are basically counterfactual” because the “neo-Darwinian synthesis from which these ideas stem was a pre-molecular biology concoction focused on population genetics and adaptation natural history”.¹² Neo-Darwinism in any form does not provide a mechanistic means of changing the genomic regulatory systems that drive embryonic development of the body plan. Alternating the peripheral differentiation process associated with observable variability is an entirely different scenario from building a new form of animal life by changing the fundamental structure of a resilient dGRN.

Is saltational evolution the answer?

An interesting trend among developmental biologists is that due to the severe problems that the stability of dGRN structure and function present to the standard neo-Darwinian (modern synthesis paradigm), many tend to gravitate towards a hopeful monster type of evolutionary scenario. This idea started well before the era of genomics and molecular biology with the writings of Richard Goldschmidt during a career that spanned from 1900 to 1958.²⁷ He was ahead of his time in that he promoted a view of physiological genetics emphasized by the dynamics associated with the products of genes such as enzymes, hormones, or inducing substances. He also believed that the concept of genes as discrete units was not as cut and dried as the leading Darwinists of the day believed. Most importantly, he proposed that if evolution was to be properly understood, it had to be directly linked to developmental processes with the timing and quantity of the product of a gene being key elements.

Goldschmidt astutely believed that ‘microevolutionary’ research which merely studied the distribution of variation within interbreeding taxa, did not provide answers to the bigger problems of discontinuity and unbridgeable gaps associated with macroevolution. Harvard paleontologist Stephen Gould also knew this to be true due to the clearly observable discontinuity between animal forms in the fossil record. In fact, Goldschmidt’s ideas were revived by Gould. In a 1977 article titled ‘The return of hopeful monsters’, Gould stated that as “a Darwinian, I wish to defend Goldschmidt’s postulate that macroevolution is not simply microevolution extrapolated, and that major structural transitions can occur rapidly without a smooth series of intermediate stages”.²⁸

These ideas, initially promoted by Goldschmidt and later revived by Gould, were originally based on homeotic

mutations observed in fruit fly developmental genes that gave four wings instead of two and caused legs to develop in place of antennae (figure 2). Of course, these are detrimental effects providing no benefit to the fly. These genetic aberrations cause displaced body parts due to mutations in key genes involved in embryo patterning.²⁹

Modern developmental biologists typically still adhere to a form of saltational macroevolution because of the inherent evolutionary developmental problems associated with mutations and the pervasive evidence of fossil record discontinuity. However, they now propose that the evolutionary mechanism itself is related to changes in the regulatory structure of dGRNs, not mutations within the kernel level or core transcription factor genes themselves.^{10,11,30}

Because these internal nodes in the dGRN are so impervious to change, it is believed that somehow subcircuits in dGRNs themselves have been co-opted, re-purposed, or as some say, ‘rewired’, to create new highly different phenotypes.^{31,32} Of course, this has never been observed at the level needed to account for large macroevolutionary changes—it is only a hopeful inference. The alteration of a developmental regulatory sequence, especially enhancer elements, has been observed to contribute to differential patterns in peripheral gene expression associated with phenotypic variability within a genus or species.³³ However, it has never been shown to occur in the re-patterning of internal dGRN nodes to produce a fundamentally new or different type of creature required to explain macroevolution. Furthermore, if developmental subcircuits could somehow

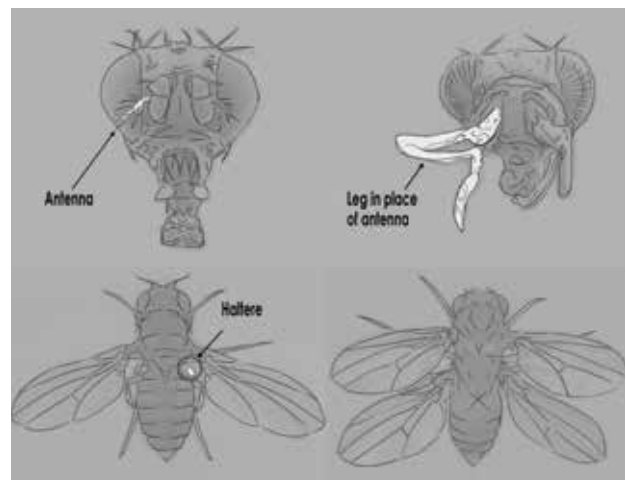


Figure 2. Mutations in top-level developmental homeotic genes involved in embryonic patterning result in misplaced body parts as vividly documented in *Drosophila* (fruit fly). The upper panel shows legs growing in place of antennae. The lower panel shows an extra abdominal segment with an extra set of wings. Because the haltere (an organ involved in flight stability) is missing in the four-winged mutant, these aberrations prohibit flight. Mutations such as these are ultimately lethal.

be coopted or repurposed or re-wired to foster evolution, this does not explain how or where the original developmental information arose in the first place. For all practical purposes, developmental biologists have yet to propose a viable mechanism for saltational evolution to occur.

In consideration of the interaction and complexity of dGRNs, one of the few researchers that has tackled the developmental conundrum is Michael Lynch. Like his colleagues in developmental genetics, Lynch admits that the modern Darwinian synthesis offers no credible solution.³⁴ He states, “Although numerous investigators assume that the global features of genetic networks are moulded by natural selection, there has been no formal demonstration of the adaptive origin of any genetic network” and “the mechanisms by which genetic networks become established evolutionarily are far from clear”.³⁴ So what is the alternative model proposed by Lynch that might account for the origination of fundamentally new complex genetic networks that would propel evolution? Amazingly, he puts forth a neutral model evolutionary idea on a grand scale where genomes and their complex interdependent networks stochastically evolve through mutations and random genetic drift. Lynch claims:

“... many of the qualitative features of known transcriptional networks can arise readily through the non-adaptive processes of genetic drift, mutation and recombination, raising questions about whether natural selection is necessary or even sufficient for the origin of many aspects of gene-network topologies.”³⁴

Needless to say, Lynch’s ideas are pure hopeful speculation and the many problems with the neutral model of evolution have been discussed at length previously in this journal.^{35–37}

Saltationist hyper-evolution in creation science?

Hopeful monster-style evolution is not just the playground of secular developmental geneticists. Surprisingly, a form of rapid saltational evolution with direct implications on our discussion of dGRNs has been proposed recently within the young-earth creationist community.³⁸ The basis of this idea stems from the acceptance by some geologists that the stratigraphic boundary marking the end of the Genesis global Flood is at the top of the Cretaceous. This becomes problematic as most mammal fossils are located above this boundary in the Paleogene and Neogene. Thus, it is believed that the crown mammal groups found in these sediments were the result of punctuated equilibrium-style diversification from a limited number of mammal groups on the ark which were then somewhat ‘miraculously’ entombed in localized post-Flood watery catastrophes the world over in the short space of just a few hundred years. Kurt Wise, who is a creationist paleontologist and a former graduate

student of saltation-promoting evolutionist Stephen Gould, is a leading proponent of this idea who states that this “suggests a remarkably complete post-Flood fossil record, with most biostratigraphic gaps probably no more than decades in length”.³⁹ Like his secular colleagues, Wise can pinpoint no mechanism to underpin his ideas and in fact promotes a more rapid form of hyper-evolution that even evolutionists find credible. University of Akron evolutionist and vocal creationist critic Joel Duff states:

“Kurt Wise has taken the hyper-evolution rapid-speciation young-earth model of the origin of biological diversity and pushed it nearly to its logical end. Consistent with his ideas about the possible origin of whales from walking ancestors, he lists seals and sea lions together with bears as having a common ancestor on the ark.”⁴⁰

While not the purpose of this report, many previous papers have discussed at length the geological and paleontological shortcomings of placing the post-Flood boundary at the Cretaceous-Paleogene.^{41–51} Bolstering these efforts is a recent research report by geologist Tim Clarey using large-scale global stratigraphic geologic data sets.⁵² These comprehensive results “collectively establish that the Flood/post-Flood boundary had to have been much higher in the Cenozoic rock record”.⁵² As noted by Clarey, “the advocates for a K-Pg boundary end to the Flood have backed themselves into a corner by giving themselves only about 100 years of time for the entire Tertiary system to be deposited in a series of local catastrophes”. And, “This is why Wise is advocating evolutionary saltation to explain the mammal record in the Tertiary. He has to. How else do you explain the mammalian fossil record of the Tertiary?” Clearly, neither the findings of complexity and stability in dGRNs nor the global geologic record support the contentions of those attempting to unnecessarily integrate Gould-style evolution into the creation model.

Increasing developmental complexity with eco-evo-devo

Organisms live in a dynamic world where symbiosis and phenotypic plasticity are now being shown to be the rules, not the exceptions.⁵³ Unfortunately for the evolutionist, these new layers of complexity raise more questions than answers. Not only are organisms dependent on their own internal dGRNs for development, but layers of interactive complexity also exist that are related to other organisms and complex networks of sensory inputs and responses. Secular biologists are now calling this new, and somewhat broad field, ecological evolutionary development or eco-evo-devo.^{53,54}

Developmental plasticity is the ability of an embryo to adjust and change its form based on environmental

cues detected by complex sensory networks and adaptive programs built into the organism. A single genome can provide the differentiation specifications to provide a variety of adaptive forms, physiologies, and phenotypes. Through epigenetic modifications to the genome, many of these traits can also be inherited for multiple succeeding generations—giving offspring a fast track on adaptation.⁵⁵

Directly related to the concept that an organism both requires and dynamically responds to external inputs for development is the concept of developmental symbiosis—a harmonized process requiring a symbiotic interaction. For all practical purposes, there are no germ-free organisms in nature and many of these intimate interactions are required for development. For example, the seeds of orchids will not germinate without a specific type of fungus.⁵⁶ The proper developmental patterning regarding axis orientation in a nematode requires the presence of a specific type of bacterium.⁵⁷ The intestines of mammals and fish require gut microbiota to complete their proper development.^{58–60} If the developmental complexities inherent to dGRNs within an organism's own genome were not enough to completely invalidate evolution, the fact that organisms require other organisms (having their own dGRNs) to develop properly, buries the concept of macroevolution even deeper in the abyss of unreality.

Summary

At the very core of the validity of models for macroevolution is how organisms develop. Any form of Darwinian evolution requires that new developmental adaptations arise via random mutations that somehow provide a novel advantageous selectable trait. Decades of developmental genetics research in a wide variety of organisms has documented in detail the fact that once an embryo begins to develop along a certain trajectory, mutations in top and mid-level transcription factor genes in the hierarchy model of regulation described by Davidson cause fatal catastrophe in the program. This mutation-intolerant obstacle poses a complete barrier for the modern Darwinian synthesis, the neutral model, and saltational evolution.

Another important aspect of the developmental genetics paradigm is the paradox of conserved protein sequence among top-level transcription factors combined with their intolerance of mutation. It is quite a quandary for the evolutionist—extreme conservation of sequence would seem to support common descent yet lack of mutability negates the fundamental requirement of evolutionary change. An Intelligent Design model, however, would predict that common code serving a general common purpose would be found among unrelated engineered systems that were

the work of the same Creator—exactly as we find in man-made systems.

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Jeffrey P. Tomkins has a Ph.D. in Genetics from Clemson University, an M.S. in Plant Science from the University of Idaho, Moscow, and a B.S. in Agriculture Ed. from Washington State University. He was on the Faculty in the Dept of Genetics and Biochemistry, Clemson University, for a decade, where he published 58 secular research papers in peer-reviewed scientific journals and seven book chapters in scientific books—in the area of genetics, genomics, and proteomics. For the past five years, Dr Tomkins has been a Research Scientist at ICR where he has published 30 peer-reviewed creation science journal papers, numerous semi-technical articles on the ICR web site and their magazine Acts & Facts, and two books.

Jerry Bergman has nine academic degrees, including 5 masters and two Ph.D.s. His major areas of study for his graduate work include anatomy and physiology, biology, chemistry, and psychology. He has graduated from Wayne State University in Detroit, Medical University of Ohio in Toledo, University of Toledo and Bowling Green State University. A prolific writer with over a thousand publications to his credit, including 43 books and monographs, Dr Bergman has taught biology, microbiology, anatomy and physiology, chemistry, biochemistry, geology, astronomy and psychology at the college level. Now retired, he has taught at The University of Toledo Medical College, The University of Toledo, Bowling Green State University and other schools for a total of close to 50 years.

Christian theology and the rise of Newtonian science—imposed law and the divine will

Dominic Statham

In order for science to progress, it was necessary to reject the erroneous view of nature handed down by Greek philosophers, and which dominated among the intellectual elite during much of the medieval period. Leading historians of science acknowledge that the Christian doctrines of God and Creation played a pivotal role in this process. The Greek view of nature as a living organism was replaced by the biblical view that only people and animals have souls. This led to the rejection of the Greek explanation for motion as arising from tendencies internal to objects, and its replacement with the concept of external, divinely imposed laws. The Greek view that natural processes are governed by eternal principles binding even on the gods was replaced by the biblical view of God's omnipotence and His freedom to create as He willed. This led to the belief that the laws of nature were determined entirely by God's choice and could, therefore, only be discovered by observations.

At the heart of scientific enquiry is the *faith* that the world is orderly and behaves consistently from one day to the next.¹ One might ask, however, how this belief arose. According to Peter Harrison, formerly Professor of Science and Religion at Oxford University, it was, in a large part, “the *theologically informed assumption* that there are laws of nature, promulgated by God and discoverable by human minds (emphasis added).”² Eminent Philosopher of Science Alfred North Whitehead would agree. He wrote:

“My explanation is that the faith in the possibility of science, generated antecedently to the development of modern scientific theory, is an unconscious derivative from medieval theology.”³

Prior to the late medieval period, Greek philosophy dominated among the intellectual elite. However, around the 13th century onwards, there was a reaction against this by Christian theologians. Philosophers and historians of science have argued that this rejection of the Greek understanding of nature, particularly the teachings of Plato, Aristotle and the Stoics, and its replacement by the biblical worldview, substantially underpinned the rise of modern science.^{4,5,6,7,8}

The Greek view of nature

In the thinking of most Greek philosophers, the world was a living, divine organism. For some, even matter was understood to have god-like attributes, being self-sufficient and unchangeable, with inherent properties determining a universal world order binding even upon the gods. This divine substance governed the development of the world and dictated the movements of the heavenly bodies. Consistent with this belief, the Greek poet Hesiod (c. 700 BC) thought that the earth *generated* the mountains. In contrast, the

Hebrews saw the world forming according to God's *command* (e.g. Genesis 1).

Plato

In the thinking of Plato (c. 428–348 BC), true reality is found in the realm of thoughts, rather than by observing and learning from our world. Using our senses, we perceive only shadows of reality. The principle is applied generally so that everything known in our world, material or immaterial, exists as a more perfect ‘ideal’ or true ‘form’ in some higher plane. Legal decisions made in courts are our best attempts to administer justice but are never wholly successful as true justice remains transcendent. Round plates produced by a potter or circles painted by an artist are merely imperfect representations of true roundness which can only be pictured in the mind or expressed mathematically. These ‘forms’ or ‘ideas’ are divine and explain the nature of objects. While ‘forms’ are eternal and immutable, objects are changeable. Hence, ‘forms’ are considered more certain than what is observed, and logical reasoning and analysis are understood to be more reliable than fallible observations.

According to Plato, when ‘the Demiurge’ (the creator) shaped the world, he was constrained to follow these pre-ordained ‘ideal’ patterns, rather than being free to make it as he wished. In addition, he had to use materials he had not created himself and these tended to resist his attempts to form them. Galen (c. 129–216) was another influential Greek writer who rejected the Genesis account of creation because this was contrary to his understanding that the creator would be limited in his work by the nature of matter.⁹

Instead of studying the motions of the planets and concluding from this that they follow elliptical orbits, as

did Johannes Kepler (1571–1630), Plato ‘reasoned’ that they must follow circular paths because circular motion is most perfect, an ‘ideal’ form, and most befitting to the gods. Similarly, he ‘deduced’ that the universe must be spherical because this is the ‘ideal’ shape. In fact, Plato explicitly rejected the view that astronomical observations were useful, arguing that we should “leave the starry heavens alone”.¹⁰ In this he followed his teacher, Socrates (c. 470–399 BC), who, while regarding astronomy worthwhile in determining the time or day of the year, considered that learning the courses of the stars, or enquiring about the causes of their movements, was a waste of time. According to his pupil, Xenophon (430–350 BC), Socrates “held that speculators on the Universe and on the laws of the heavenly bodies were no better than madmen”.¹¹

Aristotle

Like Plato, Aristotle (384–322 BC) believed the world to be as it is due to necessity, conforming to eternal, unchangeable principles which could be deduced by processes of reason. To him the world was like a huge animal which breathed, grew, and decayed. In this he again followed Plato who asked: “In the likeness of what animal did the creator make the world?” In his writings Aristotle continuously appealed to biological similes, for example, likening earthquakes to animal digestion and the motion of stars to the locomotion of quadrupeds.¹² As did Plato, he saw the heavenly bodies as living beings.

In the thinking of Aristotle, physical objects are a compound of ‘matter’ and ‘form’, where ‘form’ unifies some matter into a single object and determines its structure, properties, and activities. Without ‘form’, matter cannot even exist. Aristotle’s god, however, has little power over nature, having jurisdiction over neither the matter nor the form of natural objects.^{13,14}

Aristotle distinguished between ‘natural motion’ and ‘violent motion’, the former arising from the nature of an object, the latter being imposed on it. For example, the natural motion of a stone would be to fall to the ground. However, if thrown, it will for a time move in an unnatural or ‘violent’ way. Whereas the natural motion of terrestrial bodies is rectilinear, the natural motion of celestial bodies, due to their being made of a different substance, is circular.¹⁵

The Stoics

According to the Stoics, the material world was impregnated with reason, and objects, along with people and animals, had souls. All was part of a universal world soul, with its individual parts in sympathetic relations to one another. To the Stoics, ‘natural law’ was ‘immanent’,

i.e. inherent in the structure of things, and this explained everything from the behaviour of people and animals to the movements of the heavenly bodies. ‘Laws of nature’ arise out of necessity, in the properties of matter, and hence knowledge of the nature of things is thought to be the key to understanding their relations to one another.

Medieval scholastics often amalgamated Greek and biblical thinking. For example, Thomas Aquinas (c. 1224–1274), while accepting the omnipotence of God, also saw natural law as immanent in the universe. For him, eternal law is nothing other than God.¹⁶ Some wrote of ‘substantial forms’ impregnated in nature, internal causes of processes arising from objects possessing soul-like powers. Unobservable ‘occult qualities’ adhered to objects like ‘little ghosts’, producing effects by ‘sympathy’ and ‘antipathy’.¹⁷ Sympathy, for example, was thought to explain the attraction of iron to a magnet—just as man is attracted to woman. The doctrine of *horror vacui* (abhorrence of a vacuum) was thought to explain why water rose in ‘suction’ or ‘vacuum’ pump barrels. Supposedly, this was because nature had an antipathy to empty space.^{18,19}

An impediment to science

Platonic thinking was antithetical to science because it detracted from the view that the world could be understood by learning from observations. In contrast, biblical thinking pointed to this as the only way of discovering reality. The Bible teaches that God is omnipotent and was in no way constrained to create according to any prescribed pattern. For, “Whatever the Lord pleases, he does, in heaven and on Earth, in the seas and all deeps” (Psalm 135:6). Since He created matter *ex nihilo* (from nothing) he could endow it with whatever properties He chose. In biblical thinking, the natural order arose as a result of a historical act of creation (Genesis 1:1ff); nothing about it is either eternal or necessary and the Creator was not constrained to follow pre-existing ‘forms’. Rather, the world is as it is, and behaves as it does, because of *divine choice*, the will of a sovereign deity. Hence, it is impossible to determine the nature of things based on reason alone. Only by studying His creation could God’s design be known.

The rejection of Greek thinking by the founders of modern science is exemplified in Roger Cotes’ preface to the second edition of Isaac Newton’s *Philosophiae Naturalis Principia Mathematica* (*Mathematical Principles of Natural Philosophy*):

“Without all doubt this World ... could arise from nothing but the perfectly free will of God directing and presiding over all. From this fountain it is that those laws, which we call the laws of Nature, have flowed; in which there appear many traces indeed of

the most wise contrivance, but not the least shadow of necessity. These therefore we must not seek from uncertain conjectures; but learn them from observations and experiments.”

Newton himself, in the very first sentence of his preface, wrote of how modern thinkers, having discarded “[soulish] substantial forms and occult qualities have endeavoured to subject the phenomena of nature to the laws of mathematics”. A committed biblical creationist, he also rejected the Greek view that God would have been constrained in His acts of creation in any way. He wrote of God:

“... we admire him for his perfections; but we reverence and adore him on account of his dominion ... and a God without dominion, providence, and final causes [i.e. design], is nothing else but Fate [i.e. necessity] and Nature.”²⁰

The world—animate or inanimate?

Plato taught that the cosmos created by the Demiurge was a living organism, that the world had a divine soul, and the stars and planets were gods. In a similar vein, Aristotle taught that stones fall to the ground because they have a *yearning* for the centre of the universe (which he believed to be the centre of the earth). Such thinking was an obstruction to science because it attributed causes of motion to motives and inner compulsions, rather than to impersonal, external forces.²¹

In contrast, the Bible clearly distinguishes between the Creator and the creature (i.e. that which was created). God is spirit (John 4:24) and is a being separate from the world. There is only one God (Isaiah 45:5) and His creation is not divine; for God said: “Before me no god was formed, nor shall there be any after me” (Isaiah 43:10). Indeed, to attribute divinity to the creature is idolatry. As argued by Oratian priest Nicole Malebranche (1638–1715), there can be only one cause which is “nothing but the will of God”. For Malebranche, Greek ‘forms’ are nothing more than “the little gods of the heathen” introduced by the evil one to occupy the hearts which the Creator has made to belong to himself.²²

The cosmos is not an organism and does not have a soul, this being firmly established in the very first book of the Bible. Here only animals and people are described as ‘living creatures’ (Genesis 1:20, 24). The universe is not eternal and does not have any self-sustaining or self-generating powers. Rather it is the work of a single Creator upon whom it is totally dependent. Hence, objects do not have minds and desires, and are not subject to laws inherent within their natures; instead the non-living world operates according to laws imposed on it from without. The moon gives rise to tides, not because it has some sort of friendship with the water of the oceans, but because of the impersonal law of gravity.

The lawgiver

The God of the Bible is the lawgiver in both the moral and physical realms. He gave the 10 commandments to Moses (Exodus 20:3–17) and wrote the requirements of the law on the hearts of men so that they “by nature do what the law requires” (Romans 2:14–15). He is the one who gathered the waters together (Genesis 1:9) and “assigned to the sea its limit, so that the waters might not transgress his command” (Proverbs 8:29). He “made a decree for the rain and a way for the lightning of the thunder” (Job 28:26). He created the sun to govern the day and night (Genesis 1:16), “commanded the morning ... and caused the dawn to know its place” (Job 38:12). He created the stars to mark the seasons (Genesis 1:14), knows “the ordinances of the heavens”, and established “their rule on the earth” (Job 38:33). He continually “upholds the universe by the word of his power” (Hebrews 1:3).

In the Old Testament, God’s commands to nature are often expressed in legal language. For example, the Hebrew word *huq* is used in both Proverbs 8:29 and Job 28:26. Its verbal form means to ‘engrave’ or ‘legislate’ and is often used in the context of God giving moral and ritual laws. In both these verses, the 4th century Vulgate translation uses the Latin word *lex*, meaning ‘law’. According to philosopher of science Edgar Zilsel, verses such as these “were quoted through the centuries again and again, and have decidedly contributed to the formation of concepts in rising natural science.”²³ Galileo Galilei (1564–1642), for example, wrote that nature “never transgresses the bounds of the laws imposed to it”, being a “most careful executor of the orders of God” and argued for nature’s strict observance of God’s commands citing, among others, Job 28:26, 38:8–11 and Psalm 104:9.²⁴ According to Professor Friedrich Steinle, for Galileo the concept of law in nature was “most intimately and inextricably connected with theological considerations concerning God’s activity as legislator”.²⁵

Nobel Prize winner Melvin Calvin also acknowledged the influence of the Bible in these matters. Referring to the necessity of conceiving of the world as orderly, he remarked:

“As I try to discern the origin of that conviction, I seem to find it in a basic notion ... enunciated first in the Western world by the ancient Hebrews: namely that the universe is governed by a single God, and is not the product of the whims of many gods, each governing his own province according to his own laws. This monotheist view seems to be the historical foundation for modern science.”²⁶

Drawing on his Christian theology Newton wrote:

“This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent and powerful Being. ... This Being governs all things, not as the soul of the world,

but as Lord over all; and on account of his dominion he is wont to be called *Lord God or Universal Ruler*.²⁷

Imposed vs immanent law

The Greek view of the cosmos as an organism drew upon an analogy between the natural world and a human being. As such it was understood to have been endowed with intelligence and life. In contrast, the Christian view was based on an analogy between the natural world and a machine.²⁸ Hence, the movements of bodies were not due to their being capable of controlling themselves; nor did they arise from ‘immanent laws’ (i.e. those inherent in objects and in the structure of reality itself). Rather they were the result of ‘imposed laws’ set up by an external, omnipotent Designer.²⁹ According to the Bible, this same God had created the mind of man after His own likeness (Genesis 1:26–27, 5:1–3); hence it was considered possible for us to understand His designs and describe the scientific principles by which they operated.³⁰

The divine will

Francis Oakley, formerly Professor of the History of Ideas, Williams College, Massachusetts, documents how, beginning around the 13th century, European theologians rejected Greek thinking about God and nature and replaced it with biblical thinking.¹⁶ This began in 1277, when Etienne Tempier, Bishop of Paris, and Robert Kilwardby, Archbishop of Canterbury, formally condemned a list of 219 philosophical propositions as contrary to the Christian faith. These focused particularly on the teaching of Aristotle and the need to refute the view that God was in any way limited in His absolute power to do whatever He wishes.

This emphasis on the ‘divine will’ was strengthened, among others, by William Ockham (c. 1332), who insisted that both moral law and the whole of creation are entirely subject to God’s choice. Ockham drew attention to God’s ability to overrule natural law by reference to Shadrach, Mishach, and Abednego’s emerging

unscathed from Nebuchadnezzar’s fiery furnace (Daniel 3). Jean Buridan (c. 1350) argued that God, “in his most free will” may have created things which did not seem reasonable to the human mind—and this, of course, is true. Who would have thought that light would sometimes behave like a wave and sometimes a particle? Nicole Oresme (c. 1377) rejected Aristotle’s assertion that the earth must be stationary and that the heavenly bodies must move in circular orbits. To Oresme, God would do as He pleased.³¹

Of great significance is that two of the great German reformers, Martin Luther (1483–1546) and Philipp Melancthon (1497–1560), in order to demonstrate the power of God over nature, also referred to Shadrach, Mishach, and Abednego’s deliverance, along with, Francisco Suárez (1548–1617), William Perkins (1558–1602), John Preston (1587–1628), William Ames (1576–1633), Thomas Shepard

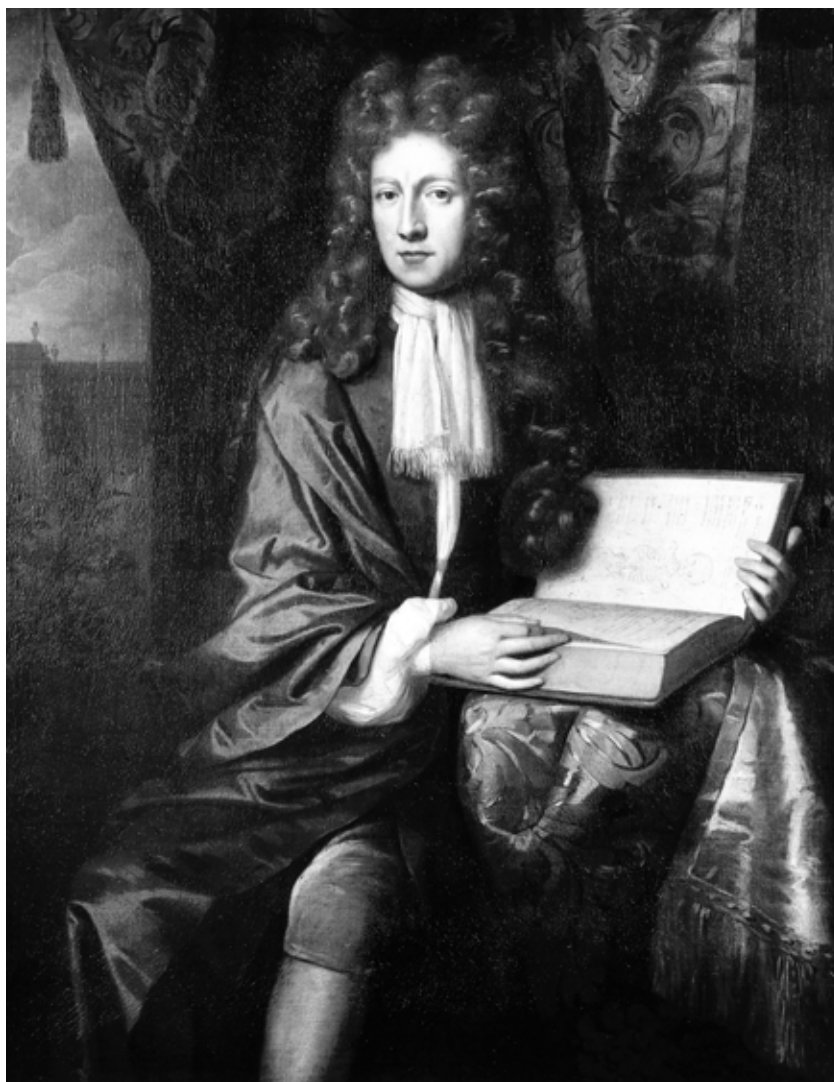


Figure 1. The ‘father of chemistry’, Robert Boyle (1627–1691), argued that God could have made other worlds where the laws of nature were different.

Portrait of The Honourable Robert Boyle (1627 - 1691), Irish natural philosopher by Kerseboom. Credit: Wellcome Collection. CC BY

(1605–1649), John Norton (1606–1663), Increase Mather (1639–1723), and Samuel Willard (1640–1707). Another was the ‘father of modern chemistry’, Robert Boyle (1627–1691; figure 1), who referred to this incident in no less than three of his works. Oakley argues that this is strongly supportive of his contention that “the scientific idea of divinely imposed laws of nature had its origins in a living theological tradition which went back to the last years of the thirteenth century”.¹⁶

Kepler argued that the failure of the Greek philosophy to birth the concept of mathematical law could be explained by Aristotle’s belief that the world was eternal and that Aristotle’s god did not impose order on the world. In contrast, Kepler maintained that “our faith holds that the world, which had no previous existence, was created by God in weight, measure, and number, that is in accordance with ideas co-eternal with Him”.^{32,33} Kepler’s understanding of ‘eternal ideas’, however, was very different to that of the Greeks. For Plato, because ‘ideas’ were eternal, they were also immutable and binding on the gods. For Kepler’s God (the God of the Bible), the principles which He used to determine the order of nature were entirely of His own choosing.

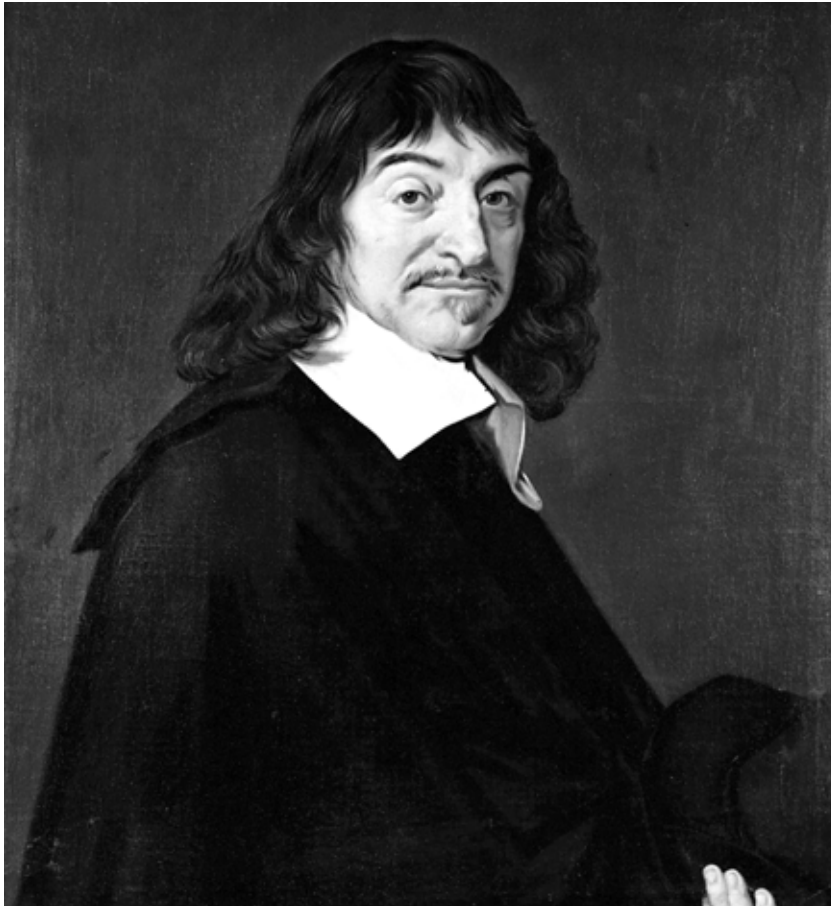


Figure 2. The ‘father of mathematics’, René Descartes (1596–1650), wrote that “the rules of nature are identical with the rules of mechanics”.

Both Boyle and Newton argued that God could vary the laws of nature. Boyle considered it plausible that God had made other worlds where “the laws of this propagation of motion among bodies may not be the same with those that are established in our world.”³⁴ Similarly, Newton argued that “God is able ... to vary the Laws of Nature and make Worlds of several sorts in several Parts of the Universe.”³⁵

This belief that the laws governing the natural world were determined entirely by the Creator’s choice led to the realisation that the world order could not be deduced by *a priori* reasoning, but only empirically, through observation and experiment.

The orderliness of creation

The God of the Bible is the One who “laid the foundation of the earth ... determined its measurements” and “laid its cornerstone” (Job 38:4–6). He “gives the horse its might”, and it is by His “understanding that the hawk soars and spreads his wings toward the south” (Job 39:19, 26). The Israelites were told to consider the stars and remember their God, who “brings out their host by number, calling them all by name; by the greatness of his might and because he is strong in power, not one is missing” (Isaiah 40:26). He is the One who established a “covenant with day and night and the fixed order of heaven and earth” (Jeremiah 33:25). “The Lord is the everlasting God, the Creator of the ends of the earth ... his understanding is unsearchable” (Isaiah 40:28).

In forming the world, God brought forth order from disorder. The original creation was “without form and void” (Genesis 1:2) and the first man was made from the dust of the ground (Genesis 2:7). Israel is said to be like clay in a potter’s hand (Jeremiah 18:6); according to the apostle Paul, God is not a God of disorder but of peace (1 Corinthians 14:33). In the first chapter of John’s gospel, the Creator is revealed to be ‘the Word’ (Greek *logos*), the incarnate Son of God. *Logos* also carries the sense of logic and reason. This *logos* is also the One whose act of redemption will one day liberate the fallen creation from its bondage to decay (Romans 8:21). Early Christian theologian Origen (c. 185–254)

argued that God conferred upon His creation an intrinsic rationality and order that reflected the divine nature itself.³⁶ This is in stark contrast to the polytheism of some pagan religions where the natural world might be subject to the whims of temperamental deities with conflicting interests. In such a world, almost anything could happen!

In his book, *Mind of God*, Paul Davies acknowledges that “the justification for what we today call the scientific approach to inquiry was the belief in a rational God whose created order could be discerned from a careful study of nature.”³⁷ According to Alistair McGrath, Professor of Science and Religion at Oxford University:

“This insight is directly derived from the Christian doctrine of creation and reflects the deeply religious worldview of the medieval and Renaissance periods ... This foundational assumption of the natural sciences—that God has created an ordered world, whose ordering could be discerned by humanity, which had in turn been created ‘in the image and likeness of God’—permeates the writing of the period.”³⁸

The natural world as a mechanism

According to the Bible, God is the Creator and sustainer of the universe and, at the same time, wholly separate from it. This, together with the sense of the orderliness of the creation, led theologians and philosophers to see the natural world as designed mechanism. Discussing blood circulation in his *Discours de la Méthode (Discourse on Method)*, René Descartes (1596–1650; figure 2) stated that “the rules of nature are identical with the rules of mechanics” and, in his *Le Monde (The World)*, he asserted “that God is immutable, and that acting always in the same manner, He produces always the same effect”. These laws, he said, are not immanent but ‘imposed’ on nature by God.³⁹ The courses of the planets, the oceanic tides and the universe in general are regular and predictable because they are determined by the God of the Bible who is faithful and sure. Descartes’ contention that the natural world is governed by an unchanging God, and hence behaves consistently from one day to the next, was an essential step in scientific progress.

Although Zilsel controversially argues that the concept of laws of nature arose primarily from sociological factors—for example, the politics of absolute monarchy—he acknowledges that Descartes “took over the basic idea of physical regularities and quantitative rules of operation from the superior artisans of his period. And from the Bible he took the idea of God’s legislation. By combining both he created the modern concept of natural law.”²³

French Bishop Nicole Oresme (c. 1320–1382) and French theologian Pierre D’Ailly (1350–1420) both wrote of the workings of the world as analogous to a clock.⁴⁰ Melancthon

(1497–1560) referred to the “whole machine of the world” serving “perpetual laws” and insisted that God is a “most free agent, not, as the Stoics used to teach, bound by secondary causes”.¹⁶ In his *De Revolutionibus Orbium Coelestium (On the Revolutions of the Heavenly Spheres)*, published in 1543, Nicolaus Copernicus (1473–1543) wrote of the “the movements of the world machine, created for our sake by the best and most systematic Artisan of all”.

In a work containing numerous biblical quotations, Boyle argued that “the universe being once framed by God, and the laws of motion being settled and all upheld by his incessant concurrence and general providence, the phenomena of the world thus constituted ... operate upon one another according to mechanical laws.”⁴¹ He also expressly denied the concept of immanent law, arguing that “the laws of motion, without which the present state and course of things could not be maintained, did not necessarily spring from the nature of matter, but depended upon the will of the divine author of things”.⁴² According to Professor Hooykass, in the thinking of Boyle and his contemporaries, “Holy Scripture ... had made their science truly free”.⁴³

Conclusion

According to Oxford philosopher Michael Foster:

“[T]he method of natural science depends upon the presuppositions which are held about nature, and the presuppositions about nature in turn upon the doctrine of God. Modern natural science could begin only when the modern presupposition about nature displaced the Greek ... but this displacement itself was possible only when the Christian conception of God had displaced the Pagan as the object ... of systematic understanding. To achieve this primary displacement was the work of Medieval Theology.”⁴⁴

By de-deifying nature and de-personalising motion, Christian theology emancipated science from its stagnation under Greek philosophy. It asserted that the universe is not eternal but created, and its nature and operating principles did not have to conform to any eternal, unchangeable ‘forms’. Emphasising God’s omnipotence and His freedom to create as He willed led to the view that the scientific method necessitated observations. The belief that there are laws imposed upon a world by an orderly, faithful, and immutable God caused philosophers to see the universe as a designed mechanism, rather than an eternally existing organism. This, in turn, led to the belief that the workings of God’s creation could be investigated, understood, and described mathematically. All this hung on the Christian doctrine of creation, as articulated so clearly in the Nicene Creed: “We believe in one God, the Father Almighty, Maker of all things visible and invisible.”

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Dominic Statham is a chartered engineer and graduate of Loughborough University in the UK. He has twenty five years experience in aeronautical and automotive engineering, with Rolls Royce (Aero and Industrial & Marine Divisions) and GKN, a leading supplier of automotive driveline components. He has extensive experience of both manufacturing and product development, and holds a number of patents. He is the author of *Evolution: Good Science? Exposing the ideological nature of Darwin's theory*. He is currently a speaker and writer for CMI (UK/Europe).

Origen, origins, and allegory

Andrew Sibley

Origen has recently been cited by several proponents of theistic evolution in defence of their position. The claim is that Origen's allegorical hermeneutic lends authenticity to a belief in deep time and evolution, and that figurative readings of Scripture have been dominant throughout Christian history. This paper responds to these claims, while also noting some difficulty with Origen's orthodoxy. The first response is in relation to hermeneutics, showing that the strong dichotomy between literal and spiritual exegeses is false. All early theologians, including Origen, read Scripture historically and spiritually, even if Origen read the six-day creation account allegorically. The second response is in relation to Origen's writing regarding Adam and the Fall, and the third, in relation to the age of the earth. It becomes clear that Origen believed in a real Adam, created physically in the recent past, who was the progenitor of all humanity. Origen also spoke against the Epicurean beliefs of Celsus, beliefs now inherent in Darwinian evolution, and so his teaching cannot be properly used to support theistic evolution.

Leading theistic evolutionists, such as Denis Alexander, Karl Giberson, and Francis Collins,¹ (figure 1) have recently emphasized allegorical readings of the Genesis creation account in support of their position, and so dismiss literal or historical readings as not strongly held in early Christianity. Towards this end the Alexandrian approach to biblical hermeneutics is referenced, especially with the writing of Origen (figure 2). The thinking of these early Christians is broad-brushed to give the impression that their work provides an interpretative framework that supports Darwin's theory of evolution. Denis Alexander, for instance, urges his readers to follow Origen, suggesting that:

"In 248 Origen wrote that Genesis references to Adam are 'not so much of one particular individual as of the whole human race'. Figurative understandings of the Genesis text have been part of mainstream theology ever since."²

And in his book *Creation or Evolution, Do we have to choose?* he criticizes those who read Genesis literally, citing Origen's apparent derogatory comments in *De Principiis* towards those who might be so silly as to think of God as a gardener planting trees in Eden.³ He then makes similar comments to those above, claiming that

"Figurative and theological understandings of Genesis 1 were the dominant approach to the text amongst both Jewish and Christian commentators until at least into the fourteenth century ... It is not until the twentieth century, with the rise of modernist interpretations of the text ... that one finds the trend to interpret the passage as if it were written in the language of modern science."⁴

Karl Giberson and Francis Collins also present a partial view of early Christian theologians that does not reflect their thinking authentically. They suggest that many of the

"Early Christian thinkers ... were capable of discerning that the Genesis creation stories were not trying to teach about the literal history of the world. The works of many of the first Christian theologians and philosophers actually reveal an interpretation of Genesis surprisingly compatible with both the great age of the earth and Darwin's theory of evolution. ... Origen opposed the idea that the creation story should be interpreted as a literal and historical account of how God created the world."⁵

In response, it is necessary for Christians to recognize that Origen's approach to biblical hermeneutics is more qualified and complex than these statements suggest, although it is relevant to acknowledge some difficulty with Origen. He lived in a time of controversy, and later received posthumous condemnation, especially at the Second Council of Constantinople, wherein some of his alleged teachings were declared anathemas, for instance his apparent belief in the pre-existence of souls, and the belief that the sun, moon, and planets might possess souls. As a result of criticism, Origen has not received a declaration of sainthood from either Eastern or Western churches. Subsequently, a good part of his writing has been neglected and is no longer extant, and that which remains, particularly *De Principiis*, has been edited by friends and foes alike. Rufinus's Latin translation was edited as an arguably justifiable attempt to return it to its original, although it also seems to have been an attempt to render Origen's writing more palatable to Roman ears.⁶ Jerome also produced an edited Latin text, but, regrettably, this editing somewhat obscures knowledge of Origen's thinking. The complete Greek text of *De Principiis* has been lost; however, significant and relevant sections, for instance Book III and IV:i–iii do remain in the original language.⁷

As an example of the impact of editing, Crouzel suggests that Origen's apparent view of reincarnation and the

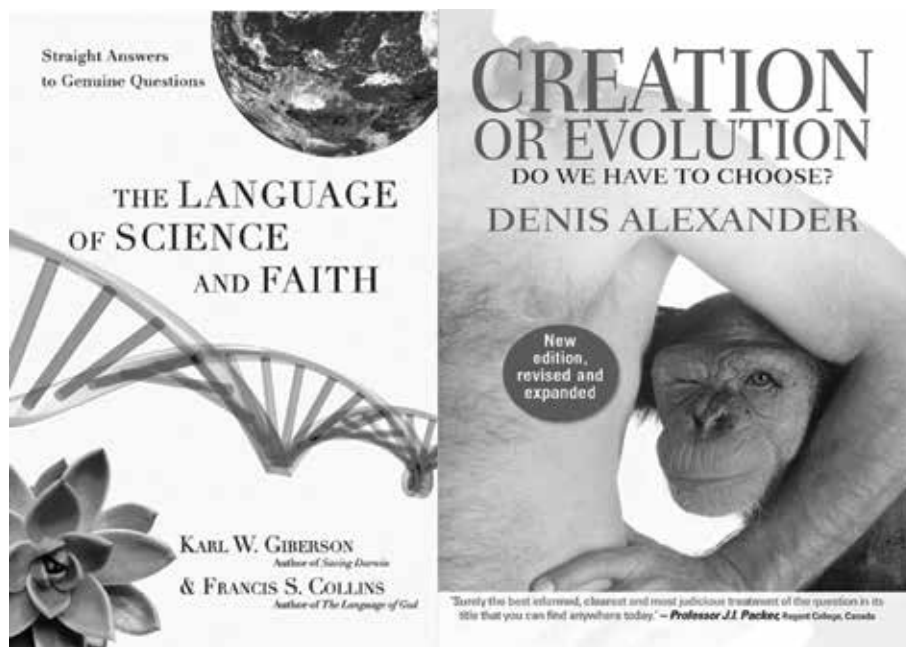


Figure 1. Giberson and Collins, *The Language of Science and Faith* (left), and Alexander, *Creation or Evolution: Do we have to choose?* (right).

pre-existence of the soul is reliant upon Jerome's Latin quotes of the *De Principiis*, but it is noteworthy that Origen wrote differently in the Greek in other passages; therefore Crouzel thinks Jerome's translation may be unreliable.⁸ Origen at times seems to suggest that Jesus and the Holy Spirit were somewhat less in status than the Father, a criticism levelled by Epiphanius in his *Ancoratus*.⁹ This leads to the claim that he was non-Trinitarian, although it may be noted that he lived at a time when the doctrine of the Trinity was not fully developed. He is however perhaps not the most appropriate role model for evangelical Christians to follow and neither is he considered the best representative of early Christian hermeneutics in Reformed thinking. However, some of the criticism ranged against him may not do justice to his original intent.

Origen, the son of a Christian martyr, became a pupil of Clement and followed his mentor in becoming head of the Catechetical School in Alexandria. The Hellenized Jewish scholar Philo was an influence upon both in their reading of Genesis.¹⁰ Origen had also previously attended lectures of the Platonist philosopher Ammonius Saccas, who was the teacher of Plotinus, a major influence in the development of Neo-Platonism.¹¹ This influence seems to have led to some of his heterodox teachings. Based upon the Platonic division of the human person into body, soul, and spirit, Origen's three levels of biblical interpretation were divided into the literal sense, the moral sense, and the allegorical sense.¹² The influence of Plato led him to emphasize symbolism and allegory with less motivation to defend Scripture in its historical sense. Origen

was apparently concerned that it ought to be read in a way that would gain respect from pagan philosophers, again perhaps revealing an unhealthy Platonic influence upon his thinking. The need for a literal defence of the Old Testament against Greek skeptics was evidently not central to his teaching, this because Scripture could be read allegorically if necessary.¹³ Although some of Origen's theology was rejected by the church, later theologians such as Pseudo-Dionysius, extended the influence of Neo-Platonism into the Medieval period with Christian mystics withdrawing from the world to seek spiritual fulfilment.¹⁴ Such an environment was not conducive to the development of science.

But even so, from available evidence his writing does not support the assertions of theistic evolutionists. As will be shown here, the evidence shows that Origen only read some elements of the Genesis creation narrative allegorically. He held other parts as history, for instance when placing Adam in chronological context, and he rejected the deep time of pagan cosmology. The following discussion will respond to three assertions relating to Origen's thinking and writing: firstly, relating to Origen's approach to biblical hermeneutics in regard to historical and allegorical readings; secondly, relating to his approach to the personhood of Adam and the Fall; and lastly, relating to his understanding of the age of the earth. Origen's influence upon Christian theology through later centuries will be held over for a separate discussion. But his response to the Epicurean Celsus suggests he should not be used to justify acceptance of Darwinian evolution, which was itself developed out of an Epicurean view of the world.

Origen: figurative or historical reading of Scripture?

There is firstly the suggestion, from Origen's writing, that figurative approaches to the Genesis text were the predominant understanding in the minds of many early theologians. The further inference being that literal or historical readings of Genesis were not strongly held, nor considered important. Alexander comments, following initial reference to Origen, that 'Figurative understandings of the Genesis text have been part of mainstream theology ever since.'¹⁵ However, this statement relies upon a false

dichotomy and is therefore misleading. Most of the early theologians read the text for its spiritual meaning, if that is what Alexander means by figurative, even as most early theologians read it literally and historically as well. Hauser and Watson point out that

“... the dichotomy of spiritual and literal does not accurately describe the interpretation seen at work in the commentaries and homilies from these schools [Alexandria and Antioch]. Both schools understood that the literal wording of the text of the Bible points to a deeper meaning.”¹⁶

Over the past half-century there has been a change in understanding of the theological differences between the centres of learning at Antioch and Alexandria, as Young and Fairbairn note.¹⁷ The prevailing view had been that the school of Antioch majored on literal readings, while Alexandria had emphasized the allegorical,¹⁸ but this is now seen as unsustainable. It is recognized that there was diversity within each centre of learning, and that both read the text literally as well as symbolically.

It is true that Origen did not hold some aspects of the creation account as historical, for instance reading the six days allegorically with creation occurring in an instant.¹⁹ He suggested further that “the Word of God has arranged for certain stumbling-blocks ... and hindrances and impossibilities to be inserted in the midst of the law and the history”²⁰ He struggled with some miracles in both the Old and New Testaments, perhaps unduly influenced by the naturalism of Greek philosophy. An example he gives in *De Principiis*, is where he considered there to be no material sense to the six jars of water that Jesus turned into wine at the wedding of Cana.²¹ These scriptural statements he believed were divinely ordained in order to cause the reader to stop and think more deeply about the meaning. And yet Origen was careful not to dismiss the whole history of Scripture. Although he struggled to accept that the first few days of creation could be illuminated “without the sun and moon and stars” or that there was a literal tree of life in the garden of Eden,²² he responded to those who would say he was rejecting all the history of the Old Testament:

“But someone may suppose that the former statement refers to all scriptures, and may suspect

us of saying that because some of the history did not happen, therefore none of it happened ... we must assert, therefore, that in regard to some things we are clearly aware that the historical fact is true [περί τινων τὸ τῆς ιστορίας εἶναι ἀληθές].”²³

There are in fact occasions when Origen reads Scripture more literally than the theologians of Antioch. Eustathius, an early fourth century Bishop of Antioch, thought Origen was too literal in his interpretation of the account of Saul’s dialogue with the deceased Samuel (via the enchantment of the witch of Endor). Eustathius preferred to read the account as a demonic deception, and not the literal ghost of Samuel.²⁴ Crouzel also observes that on occasions Origen defended the literal text of Genesis against pagan skeptics in a manner that would not be acceptable to many modern, even conservative, theologians. Concerning a defence of the scale of Noah’s Ark, he observes that “Origen in fact believed in the historicity of the Bible much more than the most traditionalist of our exegetes do today.”²⁵

There were a number of differences between Origen and the fourth-century Antiochene theologians, but it was not related to a literal versus figurative dichotomy. Both schools read the text historically and symbolically. This can be seen for instance in Diodore’s writing; he was one of the main theologians of the second period of the school of Antioch, and critic of Origen. While reading the text of Scripture literally, he also emphasized the spiritual, or anagogical reading that could be attained through contemplation:

“... we shall treat of it historically [κατὰ τὴν ιστορίαν] and literally [κατὰ τὴν λέξιν] and not stand in the way of a spiritual [κατὰ τὴν ἀναγωγὴν]²⁶ and more elevated insight [θεωρία].”²⁷

Added to this, within the Antiochene school there was a desire to read the text for its practical moral message. That is not to say that there weren’t several differences between the two centres of learning, as some divergence of opinion is evident. The early Alexandrian theologians, including Origen, favoured Greek-influenced allegory versus a more Hebraic approach to spiritual insight by those at Antioch; they favoured philosophy and abstract contemplation versus the rhetorical preaching and the moral exegesis of the Antiochenes; and there were



Figure 2. Imaginative portrayal of Origen by André Thévet in “Les Vrais Portraits Et Vies Des Hommes Illustres”

theological differences in understanding the Incarnation of Jesus prior to the resolution of the Council of Chalcedon. Antioch tended to emphasize the human nature of Christ as being distinct from the divine logos, while Alexandria focused on the divine nature of Jesus.¹⁷ Fairbairn suggests that such theological differences directed their exegesis, and not the other way around as is often considered.¹⁷

Diodore's justification for objecting to Origen's allegorical approach was perhaps also based upon the belief that allegory was too strongly influenced by Greek philosophy and pagan beliefs, for instance through the writing of Plato, and the Hellenized Jewish scholar Philo. Greek mythology was usually read allegorically without any foundation in reality. The Antiochene theologians on the other hand wanted to hold to what they believed was a more authentic Hebraic approach to biblical interpretation, which was grounded in real history, as Fuller, for instance, observes.¹⁸

However, the problem for Diodore in rejecting allegory was that Paul used the word *allēgoroumena* (ἀλληγορούμενα) in Galatians 4:24 to describe the relationship between Sarah and Hagar as symbolic of the difference between the heavenly and earthly Jerusalem. This forced him to argue that Paul was really engaged in spiritual contemplation, and not allegory, because his examples (Sarah and Hagar) were real people engaged in a real struggle, and this implied some spiritual significance for understanding the relationship between the Messianic community and apostate Israel. There is a sense though that Diodore's student Chrysostom (figure 3) softened the objection to allegory. Chrysostom wrote as follows in *Homily on Psalms 9:7*:

“But if you feel it necessary to give in addition some kind of figurative interpretation [ἀναγωγή] we have no objection. For it is possible to interpret some passages theoretically [θεωρησαι]. Others in contrast are to be understood solely according to a strict literal interpretation, for example, ‘In the beginning, God made heaven and earth.’ (Gen. 1:1). Others again in a sense different from the actual words, for example, ‘Spend your time with the hart you love, with the filly that has won your favour... (Prov. 5:17–19). ... In other passages ... it is necessary to accept both the sense of the words as they stand and the meaning that plainly arises from them as in ... ‘Just as Moses lifted up the Serpent’ (Jn. 3:14). Here we must

believe the actual fact ... and ... the sense ... signified by the fact, namely a type of Christ.”²⁸

By the early fifth century there was little difference between both centres. Cyril of Alexandria read the whole of Scripture literally as a book written by one author, but linked by a typology that was centred around Christ and salvation history. In this way he avoided the excesses of allegory and read spiritual significance from the historical text, although at times he seems to have bridged between both Antioch and Alexandria in a rather eclectic manner.²⁹ Neither did he think Christians should be ashamed of the simplicity of their faith in light of the sophistry of Greek philosophy.³⁰ In the early fifth century there was a move towards reconciliation between the two sides, primarily in understanding the divine and human natures of Christ through the doctrine of *hypostatic union*, and towards this end the *Formula of Reunion* was finally agreed at the Council of Chalcedon AD 451.³¹ There is also a sense that just as Christ's divine and human nature were held to be in union, so too literal and figurative readings of Scripture were held together.



Figure 3. John Chrysostom of Antioch. This is an early Byzantine mosaic, located in the Cathedral of Hagia Sophia in Constantinople (Istanbul)

Origen's view of Adam and the Fall

Another pressing question that arises concerns whether Adam and Eve were real people in Origen's thinking, or figurative of humanity as a whole, as Alexander, for instance, claims. He writes that Origen thought that Adam was "not so much of one particular individual as of the whole human race". And yet this view is not supported by leading theologians.³² This is the passage of Origen that Alexander alludes to:

"... so also the story of Adam and his sin will be interpreted philosophically by those who know that Adam means anthropos (man) in the Greek language, and that in what appears to be concerned with Adam Moses is speaking of the nature of man. For, as the Bible says, 'in Adam all die', and they were condemned in 'the likeness of Adam's transgression'. Here the divine Word says this not so much about an individual as of the whole race. Moreover, in the sequence of sayings which seem to refer to one individual, the curse is shared by all men. There is also no woman to whom the curses pronounced against Eve do not apply."³³

Origen was, in this passage, expounding part of his view of the Fall, and the curse upon mankind, while the allusion of Alexander is that this passage offers theological support to the belief that Adam and Eve were the chosen representative couple called from among a wider human community; the Neolithic farmers called to bear the divine image as *Homo Divinus*.³⁴ However, this doesn't accurately reflect Origen's position, nor the context of the passage, which is concerned with the impact of Adam's sin upon all mankind. Origen was on occasions concerned with genealogy, speaking of Adam and Eve as the real parents of all humanity, but when deriving theological significance, he wrote figuratively with Adam representative of humanity as a whole.³⁵

Unfortunately, this does introduce ambiguity and confusion into the minds of readers, with some of Origen's early opponents (such as Theodore of Mopsuestia) thinking that he denied the historical Adam.³⁶ And yet within Origen's wider hermeneutic the literal reading of Genesis was not dismissed, and in effect could be read figuratively whether historical or not. In a passage comparing Adam with Christ, and the church with physical Israel, Origen writes that "Isaac descended from Abraham, while all go back to Adam ..." and that "Adam is the father of all men [ὡς ὁ Ἀδὰμ πατήρ ἐστι πάντων τῶν ἀνθρώπων]".³⁷

Similar comments are expressed in his *Commentary on the Epistle to the Romans*, where Origen more clearly elucidates on the genealogical link between Adam and all humanity, so that the posterity of death passed from Adam to all men. He illustrates his argument by appealing to the account of Levi being in the loins of Abraham when he paid tithes to

Melchizedek (Hebrews 7: 9–10) to show that all were in the loins of Adam when he sinned:

"... how much more were all men, those who are born and have been born in this world, in Adam's loins when he was still in Paradise. And all men who were with him, or rather in him, were expelled from Paradise when he was himself driven from there; and through him the death which had come to him from the transgression consequently passed through to them as well."³⁸

Origen's writing seems to go further in the Preface to *De Principiis* by asserting that belief in Adam, in the plain sense, is part of the necessary doctrines of the faith; doctrines given by apostolic authority (at least according to Rufinas' Latin translation) and passed on through the church in unbroken succession:

"The kind of doctrines which are believed in plain terms through the apostolic teaching are the following: First, that God is one, who created and set in order all things, and who, when nothing existed, caused the universe to be. He is God from the first creation and foundation of the world, the God of all righteous men, of Adam, Abel, Seth ..."³⁹

These statements suggest that not only did Origen hold to a literal Adam as the father of all human beings, but also that these were considered to be necessary doctrines for biblical interpreters, given authoritatively through apostolic succession. Although these statements may be coloured by Rufinas' Latin translation, it is notable that modern proponents of theistic evolution do not seem to follow apostolic authority with regard to the creation account.

And yet Origen struggled to accept literally the idea that God formed man with his hands, or that he breathed life into his face, or that Eve was formed from Adam's rib.⁴⁰ The problem for Origen is that it anthropomorphizes God's activity and he prefers to allegorize these divine works. But he also recognized that these were actual people interacting with God. How a spiritual being interacts with physical flesh in this way is of course a profound mystery for all Christians, but it is central to the belief of the faith, for instance in holding to the doctrine of the Resurrection.

There is also an apparent modification of Origen's belief relating to the physical Fall following his resettlement from Alexandria to Caesarea, at which point he is faced with the question of infant baptism, and relatedly, the possible need for remission of sins for infants. Although Origen did not seem to believe that humanity acquired Adam's guilt, in later writing he spoke of a *macula* or *sordes peccati*: that is, a stain of sin in each person passed on through an impure blood-line to all as a result of Adam's Fall. The justification for this was Job 14:4–5, and Psalm 51:5 ("Behold, I was brought forth in iniquity, and in sin did my mother conceive me").⁴¹

His wider view of Adam's creation and fallen nature is somewhat obscure, and mainly passed on through somewhat fragmentary, or secondary evidence. Some commentators suggest that he taught a two-stage Fall with Adam and Eve created as spiritual beings prior to their physical formation: the first Fall from Heaven when they moved away from God, the second Fall earthly, apparently expounding upon Adam's prior creation in the timeless mind of God. However, other commentators suggest that Origen was merely describing the same event in different ways, and that this view arises through poor translation.⁴² This ambiguity can be seen with the account of Adam and Eve's provision of animal skins for clothing by God; some commentators have ascribed to Origen the view that the leather clothing should be read as figurative of human flesh following a spiritual Fall. Although Origen does offer this allegory as one possible meaning, he doesn't find it wholly convincing and in *Contra Celsum* suggests the meaning is "secret and mysterious", and "superior" to Plato's belief regarding "the descent of the soul which loses its wings".⁴³

As with Philo, in his *Homilies on Genesis* he may have considered the creation (ποίησις, poiesis) of Adam in the image of God as incorporeal, existing purely in the mind of God, with the formation (πλάσις, plasis, Latin plasmatus) of man occurring physically, perhaps instantaneously, on the sixth day from the clay (terrae limo).⁴⁴ Philo also believed that Adam was originally conceived in the mind of God, in his image without a body, then formed in an instant with the whole of creation in the recent past. The Fall was a result of ungodly pleasures, that led to physical death.⁴⁵ Origen's *Homilies on Genesis* seem to follow quite closely the interpretation of Philo.⁴⁶ But whatever we may think of the beliefs of Origen, they are markedly different from the beliefs of those who seek to use him to support acceptance of theistic evolution.

Origen's view of the age of the earth

As noted above, Giberson and Collins comment that many of the early theologians, especially Origen, provided an interpretation of Genesis that is compatible with "the great age of the earth and Darwin's theory of evolution".⁴⁷ And yet when one looks at Origen's actual comments, for instance in *Contra Celsum*, a different account emerges. He specifically rejected the deep time of Greek authors, and the Epicurean ideas expounded by Celsus, and the theogonies of Hesiod and others. Origen defended Jews and Christians against the charge that they were simple-minded and ignorant because they did not accept the priority of the Greek writers. He defended the writing of Moses as being superior in age and authority. The Greek writers' failure to recognize the priority of the authorship of the Mosaic account therefore renders

their argument invalid, and instead Origen thought that one may hold the scriptural account of creation with integrity. He rejected as absurd the possibility of a power of generation that emanates from Greek idols and writes:

"After this, secretly wishing to attack the Mosaic cosmogony that the world is not yet ten thousand years old [ἐμφαίνοντα μηδέπω μυρίων ἐτῶν ἀριθμὸν ἔχειν τὸν κόσμον], but is much less than this, Celsus agrees with those who say the world is uncreated, although he hides his real intention."⁴⁸

"After this Celsus quotes from literature outside the divine Scriptures [θείου λόγου ιστορίας], the stories about *the men who claimed antiquity, such as the Athenians, Egyptians, Arcadians, and Phrygians*... . It was not, therefore, the Jews who *composed a most improbable and crude* [ἀπιθανώτατα καὶ ἀμυσότατα] *story* about the man born of earth, but the men who according to Celsus were *inspired, Hesiod and his thousands of others*, who had never learnt or heard of the far older and more sacred traditions to be found in Palestine ...".⁴⁹

Origen pointedly noted that Plato was right to expel the cosmogonies of Homer and Hesiod from his "State" because it would corrupt the youth, and that the Epicurean Celsus was being mendacious. These statements reflect those of earlier Christian authors, for instance those of Theophilus of Antioch in his *Apologia to Autolycus*, written in the second century, which also strongly defended the Christian faith against the pagans. Although Theophilus was less enthusiastic towards Plato, this suggests that there was a common view among the early Christians to reject the twin beliefs of deep time and generating evolutionary powers.

"And from the foundation of the world the whole time is thus traced [Ἀπὸ δὲ καταβολῆς κόσμου ὁ πᾶς χρόνος κεφαλαιωδῶς οὕτω κατὰγεται]. ... All the years from the creation of the world amount to a total of 5698 [ἐχλήη] years, and the odd months and days."⁵⁰

"For if even a chronological error has been committed by us, of, e.g., 50 or 100, or even 200 years, yet not of thousands and tens of thousands [μυριάδες, ἢ χιλιάδες ἐτῶν], as Plato and Apollonius and other mendacious authors have hitherto written [καὶ οἱ λοιποὶ, ψευδῶς ἀναγράφαντες]."⁵¹

And similar sentiments are later expressed in Augustine's *City of God*. He writes:

"Such men are also misled by certain wholly untruthful writings which purport to contain the history of many thousands of years of time. For we compute from the sacred writings that six thousand years have not passed since the creation of man."⁵²

Not only did these early Christians reject the deep time of the Greek writers, they also specifically excluded the evolutionary ideas of Epicurus and Hesiod that were based

upon some esoteric power of generation at work in nature. One may wonder whether if Origen were alive today he would see the inherent Epicurean ideas present in Darwin's theory of evolution.⁵³

Summary

There is insufficient space here to properly consider how theologians read Scripture through the Medieval Period, except to note that Alexander is partially correct to say that there was a focus upon figurative or spiritual readings of Scripture. Although Cyril of Alexandria had tried to reign in unbounded allegory, with influence from Neo-Platonism excessive spiritual contemplation was later encouraged by Pseudo-Dionysius and others, but was most unhelpful for the development of science. With so many monastic lives dedicated to pure spiritual contemplation there was less concern to study creation for the sake of improving the material world. In this light, science as we know it could not get going, as Torrance and Harrison for instance have noted.^{13,54}

The claim that Origen's approach to hermeneutics provides room for belief in deep time and evolution within Christian theological discourse obscures the thrust of his teaching. The strong dichotomy between the Antiochene school, that focused upon literal readings, and the Alexandrian centre that emphasized the spiritual, has been shown to be false. All early theologians read Scripture both symbolically and historically, although it is probably true that Origen followed Philo in holding that the creation occurred at once in the recent past, and that the six-day account was meant to be read allegorically. This belief was also held by Clement and Augustine.

The evidence further shows that Origen held Adam and Eve to be directly and recently created, and the protoplasts of all subsequent human beings. Although on occasions he referred to Adam as figurative of humanity as a whole, when speaking chronologically he accepted that there was a genealogical link from Adam to all. Origen's beliefs about the Fall are somewhat difficult to glean, possibly coloured by errors in translation, but he seems to have believed that there was a stain of sin passing from Adam to all, even though not suggesting that humanity shares Adam's guilt.

There is also clearly a commitment, especially in his writing *Contra Celsum*, that creation occurred not even ten thousand years ago. Those who wrote otherwise did so because of a reliance upon pagan sources which he thought erroneous or mendacious. Origen held in high esteem the writing of Moses and asserted that it was superior in accuracy and antiquity to that of the pagan authors such as Hesiod and Epicurus. This raises difficulties for those who seek to use his writings to justify belief in Darwinian evolution especially when we can see the influence of these pagan authors in Darwin's own writing.

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Andrew Sibley is a professional meteorologist in the UK with a B.Sc. (Hons) degree in the natural sciences, and M.Sc. in environmental decision making. An M.Phil. dissertation in theology was completed at Exeter University in 2012 that considered the philosophy and theology of intelligent design. He is the author of a number of books; for instance, *Restoring the Ethics of Creation*, *Understanding Israel*, and *Cracking the Darwin Code*—a book that seeks to identify the non-scientific foundations of deep-time and evolution.

Salt magma and sediments interfingered

Stef J. Heerema and Gert-Jan H.A. van Heugten

Subterranean salt deposits interfinger with kilometres-thick sedimentary overburdens. Currently, the widely-accepted theory concerning salt diapirism is based on a supposed fluid-like behaviour of solid salt. However, creep experiments on NaCl are inadequate to explain horizontal displacements over distances of tens of kilometres. The overburden has also moved in a synchronic, fluid-like manner. However, solid overburden will not flow, but fracture. Therefore, synchronic flow of solid salt and solid rock is impossible.

Field and seismic observations suggest a rise of liquid salt within a fluidized overburden. It is therefore possible that today's salt/sediment deposits found worldwide were formed as salt magma interfingered with watery mud syndesimmentarily during Noah's Flood.

Hydrothermal models concerning the genesis of salt layers do not address salt tectonics and, superficially, seem to be strengthened by this rise of liquid salt. However, it is highly likely that a flow of hot water would mix with the muddy overburden, preventing the formation of pure salt pillars. So, hydrothermal models are incapable of explaining salt tectonics.

Subterranean salt deposits can dome up kilometres high (e.g. in the East Texas Basin, figure 1). The structures are usually covered with layers of sedimentary rock. The pressure of this sedimentary overburden forced the salt into pillars and dykes. For instance, the European Permian Zechstein salt formation ('dated' 272–253 Ma) is commonly thought to have started rising after enough Triassic sediments were deposited (~200 Ma).

Sometimes, the salt even penetrates the overburden. One example is the Sigsbee structural high in the Gulf of Mexico (figure 2). This ductile behaviour of solid salt is known as 'diapirism', 'halokinesis', and 'salt tectonics'. Several salts are involved, e.g. NaCl (halite), CaSO₄ (anhydrite), CaCO₃ (chalk), KCl (sylvite), MgCl₂. (To avoid misunderstanding, where we refer to 'salt', we do not refer solely to NaCl, but to all ionic crystalline compounds naturally occurring in these salt formations.¹)

Until the late 1980s, geologists normally described diapirism as a lava-lamp-like, buoyancy-driven process.² A lava lamp typically has one immiscible fluid rising while the other gives way. This movement is synchronous; it is driven by density contrasts and without stress or resistance. It was counter-intuitive to expect that solid salt and solid sedimentary rock had moved like this, since solid rock does not show fluid behaviour. Therefore, geologists rejected this model. Today, it is widely accepted that solid salt diapirism is mainly the result of differential loading, with buoyancy downgraded to secondary importance.

Hudec *et al.* wrote in 2007: "Salt is mechanically weak and flows like a fluid".³ Figure 3 summarizes their explanation. We agree that most salt structures formed when conditions allowed salt to flow like a fluid. However, the question arises whether evidence supports the idea that *solid* salt can flow like a fluid.

Solid salt flow under significant pressure gradients

Solid salt flow is well-known from salt mines, where lithostatic pressure displaces the salt towards the atmospheric pressure inside the galleries and rooms. Lithostatic pressure increases by approximately 20 MPa per kilometre depth. Solid salt, or at least halite, becomes sensitive to creep under such huge pressure differences. This results in a displacement of a few centimetres per year. However, this movement is local, caused by the weight of the overburden leading to a local subsidence in the area directly above the mine only.⁴ As the pressure gradient is limited to the mining area, the induced creep cannot influence the rest of the salt formation, which stretches out over thousands of square kilometres.

The creep behaviour of halite has been studied and tested, as it is deemed to be the key to salt tectonics. For example, Urai *et al.*⁵ gathered data from strain experiments on halite cylinders with a height of 300 mm and a diameter of 150 mm. Testing several temperatures and humidities, the authors found wet halite was the most sensitive to creep. The data shows creep for wet halite at vertical stresses as low as 0.2 MPa. As salt formations are dry (e.g. anhydrite) this is not representative. Creep within halite with a water content more representative for salt layers was found at differential stress upwards of 10 MPa at an increased temperature of 323 K (the tests showed that, the lower the temperature, the more differential stress is required to cause creep). The prolonged stress caused a shortening of the cylinder and an increase in the diameter.⁶ In other words, the vertical stress caused a horizontal orientated stress varying from the isotropic stress in the core (10 MPa) to zero at the edge of the cylinder. This differential stress in *horizontal* direction was applied over a radius of 75 mm, resulting in a mean pressure gradient of 133 MPa/m (10/0.075). However, can this phenomenon account for the huge displacements observed in subterranean

salt deposits? Gevantman *et al.* wrote concerning salt buried underneath overburden: “The mobility of rock salt is such that its original site of deposition may be as far as 25 km from the dome where it is presently found.”⁷

Let us apply these cylinder strain experiments to a vertical cylinder with a radius of 25 km under a vertical stress of 20 MPa. 20 MPa represents the pressure underneath a 1 km thick layer of sedimentary rock. The resulting differential stress in the horizontal direction is then applied over 25 km. The mean horizontal pressure gradient becomes 8×10^{-4} MPa/m, which is negligible compared to the tests at horizontal pressure gradients exceeding 133 MPa/m. The tests showed that with negligible pressure gradient there will be no creep. Even raising the differential loading factor by assuming additional kilometres of sediments were in place will not help. Therefore, the creep tests do not validate the idea that fluid-like behaviour of *solid* salt formed these salt structures.⁸

An overthrust of salt as far as 200 km on top of an overburden layer, as shown in figure 2, undermines the creep model even more.⁹ How can creep cause such an overthrust, without even the differential loading of sediments, as this salt has mainly flowed on top of the overburden? And, of course, any solid rock or ice can become part of a mass waste and slide slowly *down* like a glacier, but that system is unable to move rock upwards and sideways over more than 200 kilometres. Clearly, another approach is required.

Salt structures originated from magma

There is no modern analogue where a large salt formation is being formed, either hydrothermally via precipitation during supercritical phases, or from an igneous origin. The volume and area of salt layers are similar to those of large igneous provinces. They contain hundreds of thousands of cubic kilometres of material. Earlier publications suggested a primary igneous origin of salt,^{10,11} and challenge buoyancy-driven salt tectonics in solid rock.^{12,13} We embrace that, and suggest that a flow of molten salt brought up from the mantle by volcanic eruptions and deposited underneath muddy water explains the salt structures observed today. Salt with a temperature above its melting point becomes an ionic liquid: a fluid

mixture of anions and cations.¹⁴ The relatively low density and melting point of such a salt magma can be estimated (table 1).

Salt formations are often covered with several kilometres of water-deposited sediments. Within the framework of biblical geologic history, these sediments were most likely deposited as the floodwaters were rising during the Flood.^{23–27} If this overburden was solid when salt tectonics took place, the layers would have been fractured, which they are not.²⁸

To understand the structures, we refer to the original experimental observation that salt domes must have been formed through a lava-lamp-like, buoyancy-driven process

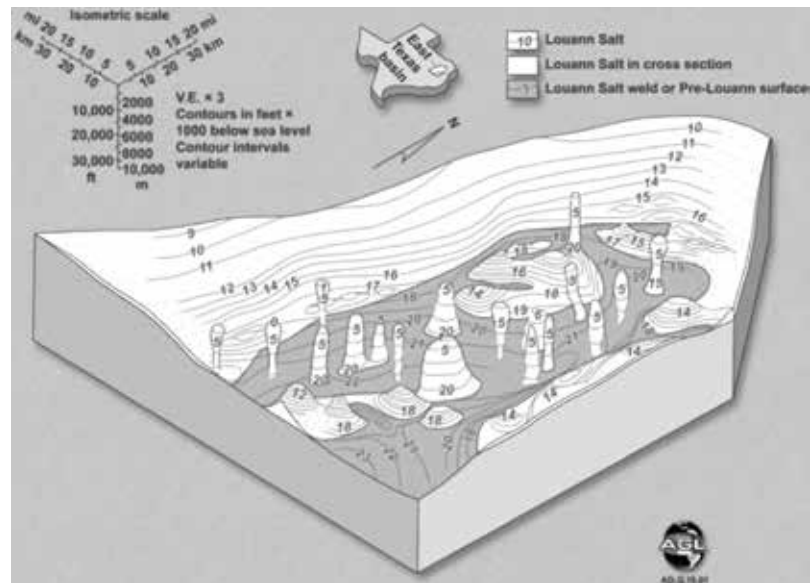


Figure 1. Salt structures present within the East Texas Basin. The Middle Jurassic salt layer interfingered with sedimentary rock. (From Jackson *et al.*^{38,39}).

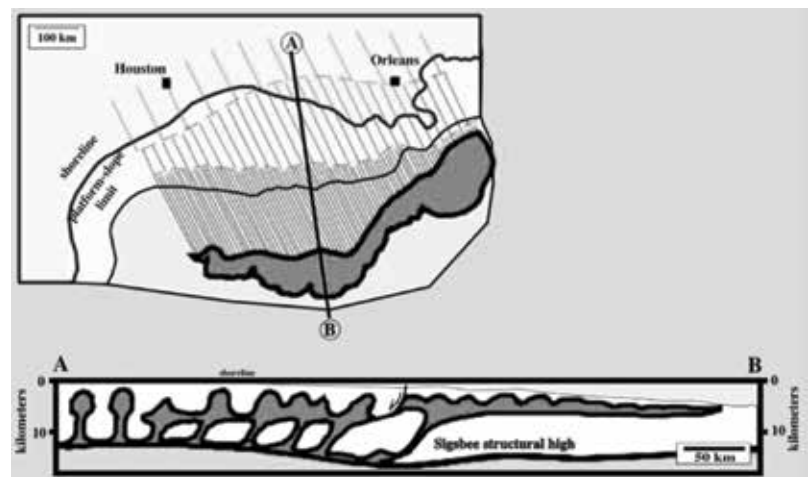


Figure 2. The Sigsbee Escarpment is the southern edge of an allochthonous sheet of Mid-Jurassic Louann Salt in the Gulf of Mexico. It is displaced over 200 km southward from the position where the salt penetrated the overburden. Even if the displacement rate of the solid salt were relatively fast with several metres each year, it would not fit in a biblical timeframe. (After Universidade Fernando Pessoa.⁴⁰).

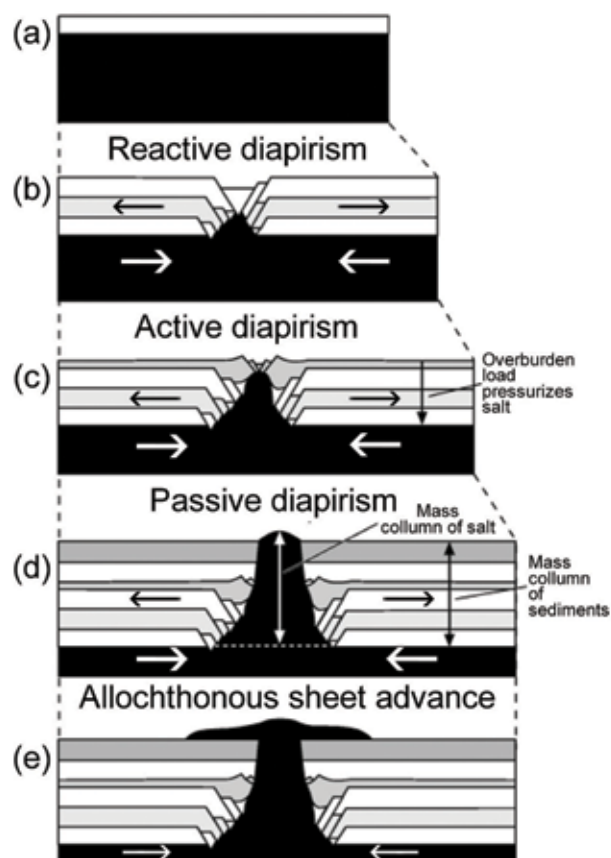


Figure 3. Widely accepted understanding of solid diapir piercement during regional extension. Indeed, if salt deformed syndesimmentarily as shown here, then salt must have flowed like a fluid. However, the model implies unnatural behaviour for a solid. (From Hudec and Jackson.³).

(figure 4). Therefore, the structures occurred when the salt was in a molten state *and* when the sediments were unconsolidated and water-soaked, allowing for hydrodynamic behaviour. Solid NaCl has a high viscosity, whereas molten NaCl has a viscosity of 1.29×10^{-3} Pa.s (at 1123 K), which is in the same order as the viscosity of water at room temperature.²⁹ Therefore, we propose that the ionic liquid could run like water. Low density combined with low viscosity would have facilitated rapid formation of pillars in watery sediments.

Steam would have formed on the sides and tops of the pillars, where the molten salt came into direct contact with watery sediments. The higher the steam rose, the more it would have expanded. This must have led to additional gravitational effects per the law of communicating vessels (figure 5).

In this energetic environment, the outside of the pillars would have cooled and solidified rapidly. Additional eruptions would have fed the salt deposits from below and raised the pressure in the liquid core of the pillars. In this way, the pillars would have acted like chimneys, delivering the salt magma into allochthonous salt sheets on top of the overburden.

Hydrothermal models

Some modellers suggest most salt beds formed by precipitation of salt from supercritical water surrounding deep hydrothermal vents.^{30,31} However, this would form solid salt, which, as described above, could not flow over tens of kilometres. No hydrothermal model for salt beds addresses the mechanism of salt diapirism. Rather, we have shown that salt was most likely a fluid during the formation of salt pillars.

Hydrothermal models could benefit from that conclusion. However, if hot water were available underneath sediments, the sediments would fall in. The water would end up in the pore spaces and would not form layers of pure salt. Hot water cannot flow tens of kilometres underneath mud without

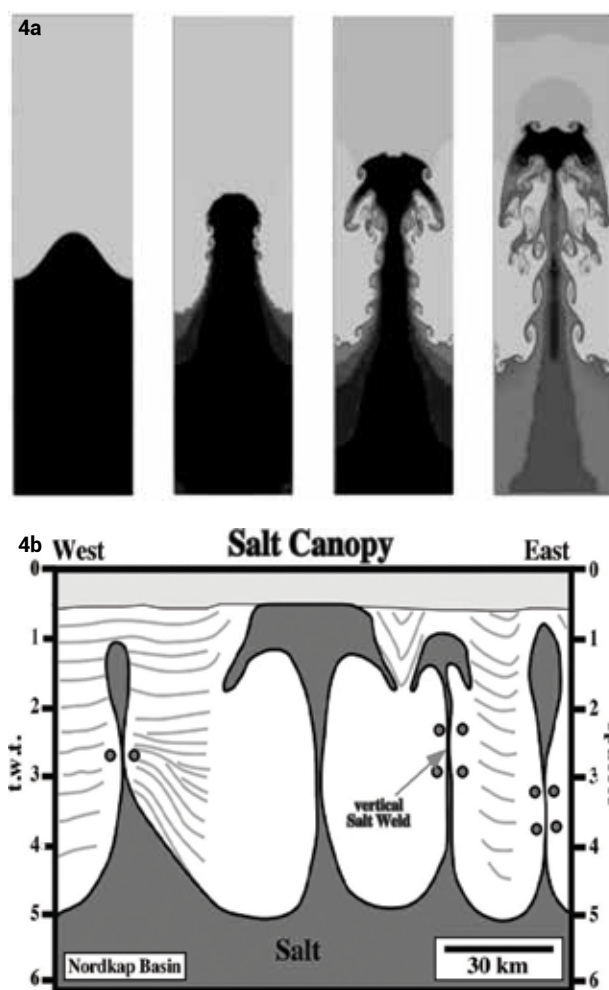


Figure 4. A hydrodynamic model of how liquid salt interfingered with mud. This process has been suggested before^{41,42} and is valid only when the sediments and the salt magma acted synchronically in a fluid-like manner. **4a.** A Rayleigh-Taylor instability as successively pictured in a test. This shows the hydrodynamics of two immiscible fluids of different densities. (After Los Alamos National Laboratory.⁴³).

4b. Salt diapirs in the North Cape Basin (Norway). T.W.T. stands for two-way-travel-time in seconds, which is seismic data. (From Universidade Fernando Pessoa.⁴⁰).

inmixing, whereas a magma flow would be isolated from the mud by a solidified skin. This skin would form out of solidifying magma on the inside, and out of sediments and minerals out of the watery mud on the outside.³² Such a skin would prevent the magma from becoming contaminated with mud or water. (Note that this immiscibility is essential for correctly referring to a Rayleigh-Taylor instability as shown in figure 4.) This skin in turn would act as a thermal insulator, causing the magma to stay liquid longer and thus be transported over long distances during the eruption.

Figure 4 is an example of how a pillar has been frozen on the move, understandable from a primary igneous origin. What mechanism will freeze a hydrothermal waterflow in the middle of wet sediments?

Where primary igneous salt is probably responsible for most salt beds, this salt magma might have induced hydrothermal deposits. Perhaps that is one of the reasons for the interpretations to date.

Timing

Salt formations worldwide are mostly covered with sediments with a catastrophic, watery origin. As salt magma and mud interfingering synchronously, the eruption of salt and the worldwide watery catastrophe must have taken place at the same time. This must have occurred rapidly, as it is unlikely that the magma would be thermally isolated in a way that would prevent solidification for years. Given that more than one worldwide watery catastrophe is ruled out by the covenant in Genesis 9, Noah's Flood alone fits the evidence, as the floodwaters were rising.

More observations

We believe the above observations suffice to rule out an evaporative or hydrothermal origin for salt formations, supporting a primary igneous origin as the only plausible explanation available. However, there is more positive

evidence for a primary igneous origin for salt. Firstly, as mentioned, the volume, area and dryness of salt layers suggest a primary igneous origin, and this has been reported in earlier publications. Secondly, it is worth considering the following:

- Fossil fuels are found abundantly below and above salt structures. The Flood might explain how organic material was buried rapidly, whereas the heat of the salt magma explains the conversion into fuel.
- Each salt pillar has a caprock containing mainly CaCO_3 and CaSO_4 . This might have been deposited by mineral-rich Flood water that turned into steam by the contact with the raising pillar, see figure 5.

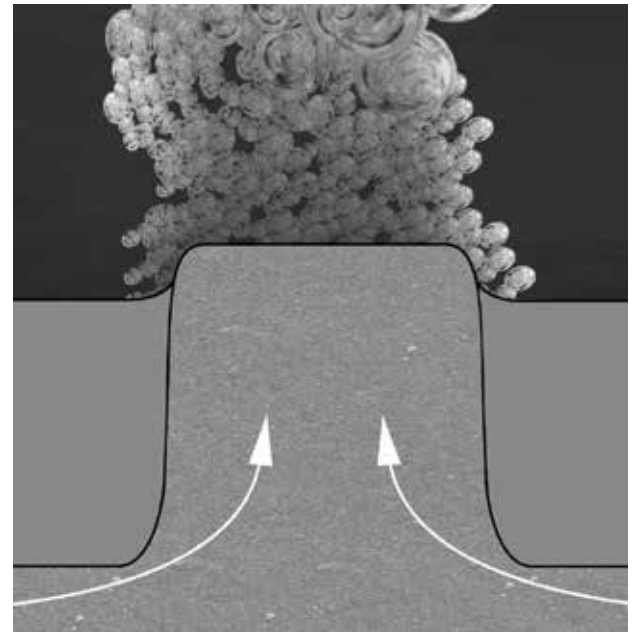


Figure 5. The law of communicating vessels demands equilibrium between the weight of the multiple-kilometres-thick mud layer plus any water above it, and the weight of the salt/steam column within. As the density of steam is relatively low, it favours the rise of the salt pillar. This picture shows the moment the salt protrudes the mud in a sub-oceanic scenario.

Table 1. Density of salt in liquid phase under atmospheric pressure. This configuration at around 1075 K has a weighted average density of 1800 kg/m³.¹⁵ Note that in magma, high pressures are applicable, which will increase the density. Higher temperatures will lower the density. But lower temperatures are expected as the melting temperature of a mixture of NaCl and CaSO_4 is as low as 998 K, and any other chemicals in the mixture will lower the melting point even further.¹⁶ This mechanism explains the temperatures of natrocarbonatite lava, which erupts with the lowest temperature lava in the world (~850 K). The Ol Doinyo Lengai volcano in Tanzania is an example.¹⁷

Salt (commonly found in the formations)	Temperature (K)	Density (liquid) (kg/m ³)	Source	Estimated volume% of salt in magma (differs per formation)
NaCl	1077	1549	Robertson, 1958 ¹⁸	65%
CaSO_4	na	2502	* ¹⁹	20%
CaCO_3	1073	2502	Liu, 2003 ²⁰	5%
KCl	1058	1517	Jaeger, 1917 ²¹	5%
MgCl_2	1077	1658	Janz, 1988 ²²	5%

- In Europe, beneath a salt deposit, the Copper Shale Formation³³ is found, consisting of a thin (~0.5 m thick) metal-bearing sedimentary layer with fossils. Its origin is debated as fish and heavy metals are not a logical combination to find in sedimentary rock. We suggest that the fossils can be explained if this was a seabed, overrun by salt magma. The heat of the magma then caused hydrothermal alteration which then explains the metals.
- Anhydrite is typically known as an evaporite,³⁴ but now primary igneous anhydrite has been identified by Luhr.³⁵ Also, the pegmatite anhydrite member within the Zechstein³⁶ is evidence for its primary igneous origin, as the name pegmatite is usually allocated to holocrystalline igneous rock crystals.
- All the chemical elements necessary to form NaCl, CaSO₄, CaCO₃, KCl, MgCl₂ (common in salt formations) are available in the magma from the Ol Doinyo Lengai volcano in Tanzania.¹⁷ E.g. sodalite (Na₈Al₆Si₆O₂₄Cl₂) containing NaCl precipitated from its melt. This volcano is positioned within the Great Rift fault line that runs from Syria, via the Jordan valley down through the Red Sea and the Horn of Africa. There are multiple salt formations situated within the Great Rift Fault (e.g. the 10-km thick Dead Sea formation).
- Testing the solidification process of ionic liquids might produce typical layers and crystals as found in the salt formations. See figure 6 as an example.
- Underneath salt structures, multiple rifts can be identified. For example, sub Zechstein rifts are: Dutch Central Graben, Central North Sea Graben, Horn Graben, Bramble Trough, Rhein Graben and the Polish Trough. These rifts could hide collapsed salt magma chambers.

It is beyond the scope of this paper to deal with all the questions and issues that arise from these considerations. Further research is required and because of its complexity some aspects may require extensive study.

Conclusions

Currently, the widely-accepted theory concerning salt diapirism is based on a proposed fluid-like behaviour of solid salt. However, creep experiments on NaCl are unable to explain displacements over distances of tens of kilometres as observed in salt deposits. Neither do the observations in salt mines. Experimental observations contradict the theory.

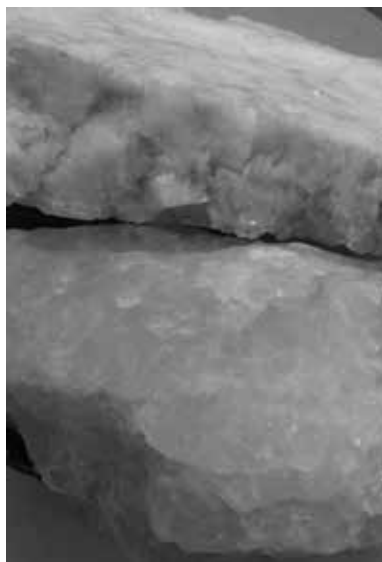


Figure 6. On top, a piece of NaCl molten and solidified in one of the tests we currently run. Underneath, a piece of NaCl (Permian Zechstein) collected from Asse II, a salt mine in Germany.

Also, hydrothermal models cannot explain salt diapirism as the hydrothermal water would have mixed with the muddy overburden, thus polluting the salt with sediments.

Evidence suggests the overburden and the salt both moved in a synchronic and fluid-like manner. Synchronic flow of solid salt and solid rock is impossible. Therefore, the empirical observations suggest the salt was liquid when it rose through a fluidized overburden at the time. The primary igneous origin of salt formations can be confirmed by the volume, area and dryness of salt layers. The idea of a massive volume of salt magma interfingering with water-saturated sediments conflicts with uniformitarian principles.³⁷ Hence, the authors conclude that a high energy, short term event, such as Noah's Flood, is responsible for the deposition of salt magmas interfingering with watery mud several kilometres thick.

Acknowledgements

Dr D.E. Shormann contributed a lot to the research. He patiently took the time to review and to edit our work, as did Shaun Doyle and other reviewers. We'd like to thank them for their efforts to improve our paper.

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Stef Heerema has a Bachelor's degree in aircraft engineering. He is a board member of Logos Instituut and ForumC, which are both foundations in the Netherlands. He has been involved with molten-salt heat treatment processes and cold-steam installations, and was also posted to the UK for the engineering of a uranium enrichment plant. As a self-employed consultant, he has investigated the feasibility of a salt mine of the Netherlands. He lectures on the topics of the origin of salt formations and Ice-Age features. This paper will be presented at the European Creation Conference in London, 22 September 2018.

Gert-Jan van Heugten has an M.Sc. in chemical engineering. He is a former board member of Logos Instituut. He is owner of WaaromSchepping, an enterprise that presents the creation message via lectures and written format. Since 2012, Gert-Jan has been a writer and editor for Weet Magazine, a Dutch creationist magazine. In 2018 he published a book for the general audience on the biblical age of the earth.

Effective population sizes and loss of diversity during the Flood bottleneck

Robert W. Carter

The extreme population bottleneck that occurred during the biblical Flood should have caused a loss of human genetic diversity. According to Scripture, the entire world population was reduced to three reproducing couples. The maximum effective population size of the Ark-borne population was calculated to be 4.5 individuals (carrying the equivalent of 9 haploid genomes). What effect would this have had on allelic diversity today? How much 'created diversity' would have been lost? The HapMap data was used to estimate the number of people required to capture X percent of the pre-Flood diversity. Even though it would require an average of 61 people to capture 99% of current diversity, the Ark passengers could have carried nearly 80% of the then-circulating alleles. Also, pre-Flood mutations were more likely to have been lost than created alleles. Even so, over 20% of created alleles should have been lost. This could have played a role in the approximately 90% decline in lifespan between the antediluvian Patriarchs and today, although one would not expect a continuing decline in diversity because the rapid expansion of the post-Flood population would have cancelled out most of the effects of genetic drift.

There were eight passengers on the Ark, but there were not eight founders of the post-Flood population. Not only are no additional children recorded for Noah and his wife, but Genesis 9:18–19 specifically claims that Shem, Ham, and Japheth are the ancestors of the “people of the whole earth”. But since the three founding males were all brothers, we need to take an inbreeding coefficient into account. This would have reduced the ‘effective’ population size to less than six people.¹

People carry two haploid copies of the human genome. Due to chromosomal recombination, any portion of either copy has a probability of inheritance of $\frac{1}{2}$ per child. Thus, the three brothers combined do not equate to six haploid genomes, because their parents only carried four haploid genomes between them. Yet, since they represented a *subsampling* of the four haploid genomes of their parents, portions of the genomes of Noah and his wife may have been lost.

For any given heterozygous allele, there is a 25% probability that only one of the two alleles will be passed by one of the parents to all three sons (table 1). In these cases, the alternate allele is lost forever. Thus, approximately $\frac{1}{4}$ of Noah’s allelic diversity and $\frac{1}{4}$ of his wife’s allelic diversity should have been lost. You can see evidence of this in the various plots of Carter and Powell (cf. figure 2a-d).² Instead of carrying the entire genome of both Noah and his wife, the brothers carried only 75% of each. In the end, Shem, Ham, and Japheth equate to only 1.5 people. Thus, the effective population size on the Ark was, at most, $3 + 2 - (0.5^3 \times 2)$, or 4.5 people.

However, if the three daughters-in-law are closely related, to each other or to the three brothers, the inbreeding

coefficient will be even stronger, and the effective population size will be that much lower. If the daughters-in-law are actual daughters (sisters to the three brothers), only the genomes of Noah and his wife could possibly have made it through the Flood. But, some small portion of their genetic diversity would still have been lost, despite the six-fold sampling. The effective population size in this case would be $2 - (0.5^6 \times 2) = 1.96875$.

Other cases, such as where the daughters-in-law were grandchildren, are possible, but the above two scenarios show the maximum and approximate minimum bounds. We do not know the true value, but I am hoping that some enterprising creation scientist will take up the challenge. The evidence should reside in the human genome.

For the purposes of the current study, it is clear that some allelic diversity should have been lost during the Flood. But how much would be lost? How much of the antediluvian genetic diversity did the Flood bottleneck wipe out if there was an effective population size of only 4.5 individuals on the Ark? Would the bottleneck have produced catastrophic levels of inbreeding?

The HapMap database can be used to answer questions like these. It was designed to sample a significant fraction of the most common genetic variants carried by modern humans. To that end, they sequenced 1.6 million single letters scattered throughout the genomes of 1,301 people from 11 diverse world populations. The sampling strategy was designed to cover approximately 10% of the total diversity found in the human genome, and there was an average of less than 2,000 nucleotides between the variants they sampled.³ The HapMap Project has been mostly superseded by larger genomics programs like the completed 1,000

Table 1. With only three children, fully $\frac{1}{4}$ of Noah's allelic diversity would be lost. In this example, Noah is heterozygous at a particular site and carries A/G. He passes one allele to each of his sons, creating eight possible scenarios. In the two cases (shaded) where only one allele is passed to all three sons, the alternate allele is lost forever. With three children and two ways to lose an allele, the probability of losing the allele = $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times 2$, or $0.5^3 \times 2$, or $\frac{1}{4}$. This applies to both Noah and his wife, each of whom passed on approximately $\frac{3}{4}$ or 75% of their genome to the next generation.

Shem	Ham	Japheth
A	A	A
A	A	G
A	G	A
G	A	A
A	G	G
G	A	G
G	G	A
G	G	G

Genomes Project⁴ or the upcoming 100,000 Genomes (UK) and 1,000,000 Genomes (US) efforts. However, the original HapMap data are excellent for the purposes of elucidating multiple aspects of the genetics of creation.

First, the data are almost all bi-allelic. That is, only two alleles exist for almost all data points (i.e. A *or* T, G *or* C). This makes for simpler historical reconstructions. Second, the data are dense, meaning they covered most of the genome with deep enough sampling to allow us to draw multiple significant conclusions about human history. And, since the sampled locations effectively cover the entire genome, we can use the data as a proxy for genome-wide processes and statistics. Third, they only sampled single-nucleotide polymorphisms (SNPs). A polymorphism is defined as an allele with a frequency of at least 0.01 in the population. Since new mutations always start out rare, with a frequency of $\frac{1}{2^n}$ by definition,⁵ a polymorphism is more likely to be in the 'created' category. Fourth, they preselected variants that are found across the world. Since it would be statistically impossible for millions of mutations to appear independently in multiple separate populations, bi-allelic SNPs with a worldwide distribution are strong candidates for 'created diversity'.

Methods

The HapMap phase 3 (release 2) data were downloaded from the HapMap Project website (<ftp://ftp.ncbi.nlm.nih.gov/hapmap/>). The data for each population are contained in two files. The first is a 'MAP' that consisted of a simple ordered list of SNPs, the SNP name (if previously described), the chromosome on which the SNP is located, and its position (in nucleotides) along the chromosome. The 'PED' file contains

sequencing data for each individual in the population. Since humans carry two of each autosome, any genomic location can contain up to two letters. Sequences were thus reported in ordered pairs (A/A, C/T, G/C, etc.). The order of SNPs in the MAP files corresponds to the data columns in the PED file. Using that information, I took the autosomal data and stripped out all SNPs that were not reported in all 11 populations or that were invariant in one or more populations, leaving 995,358 SNPs. I next calculated the allele frequencies for each allele of each SNP in each population. Some of the populations were sampled in 2-parent-child trios (table 2), so care had to be taken when calculating allele frequency; for example, not to include the children.

Next, since the individuals were not ordered according to relationship, I took the population data files and calculated the proportion of SNPs that were contained in n individuals (figure 1), starting with the first individual in the file and adding the other individuals in the order given. In any population-wide sampling scheme, one would expect to uncover a few cryptic relationships (cousins, aunts, uncles, etc.). However, for the purposes of this step, these can be ignored. The inclusion of closely related individuals early in the process could affect the results, but this should show up as a dip in the curve. Also, any effect will be averaged out quickly as distantly related people are added.

While I was calculating the above statistics, I included the average frequency of the SNPs *not* contained in n individuals. This tells us the degree to which rare alleles are disfavoured during the bottleneck.

Table 2. HapMap sample populations

Population Description	Code	n	Sampling strategy
African ancestry in SW USA	ASW	90	Trios
Utah residents with NW European ancestry	CEU	180	Trios
Han Chinese in Beijing, China	CHB	90	Individuals
Chinese in Denver, CO	CHD	100	Individuals
Gujarati Indians in Houston, TX	GIH	100	Individuals
Japanese in Tokyo, Japan	JPT	91	Individuals
Luhya in Webuye, Kenya	LWK	100	Individuals
Mexican ancestry in Los Angeles, CA	MEX	90	Trios
Maasai in Kinyawa, Kenya	MKK	180	Trios
Toscans in Italy	TSI	100	Individuals
Yoruba in Ibadan, Nigeria	YRI	180	Trios

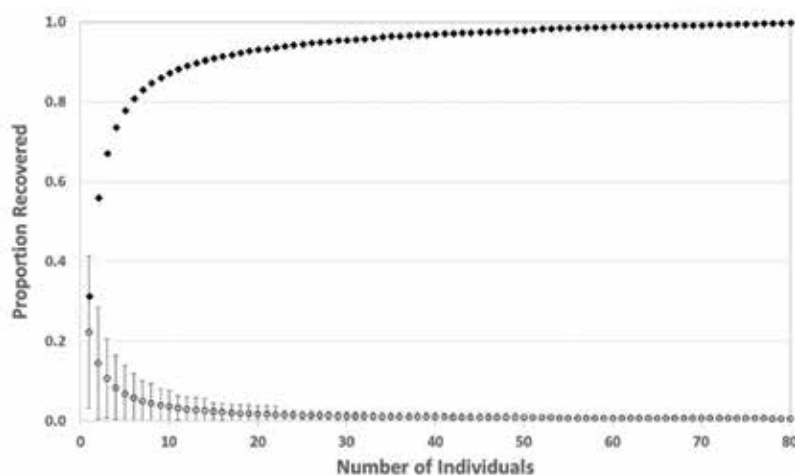


Figure 1. The proportion of worldwide SNPs captured (solid diamonds) and not captured (open circles, error bars are ± 1 SD) by n individuals from the CHB (Han Chinese in Beijing, China) population. Any single individual from this population carries over 30% of the common worldwide SNP diversity. If the Ark passengers were pulled at random from this population today, they would carry with them nearly 80% of the world's genetic diversity and an even larger proportion of common alleles than rare alleles.

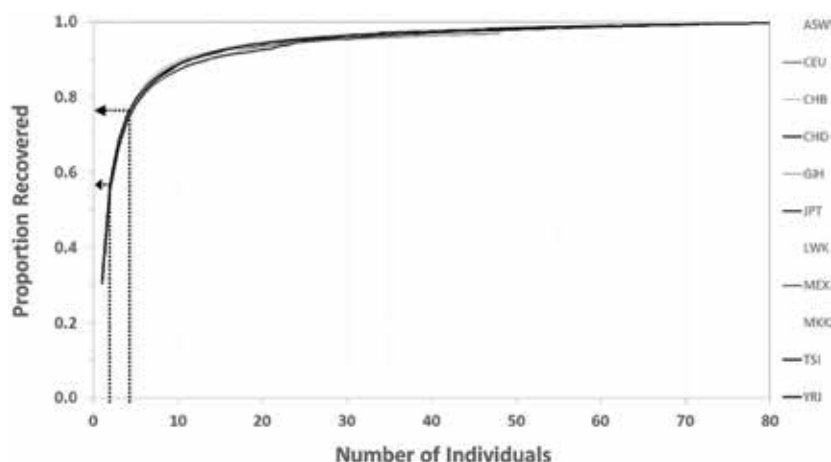


Figure 2. The proportion of worldwide SNPs captured by n individuals from the 11 HapMap populations. The differences between populations are minor, but the populations with more 'mixed-race' ancestry (e.g. ASW) and the populations with higher levels of historic inbreeding (e.g. CEU) represent the top and bottom curves, respectively. Also included are the interpolation values (arrows) for the minimum and maximum effective population sizes discussed in the text (1.97 to 4.5 individuals would capture 57.3% to 77.3% of the allelic diversity).

Results

Across all 11 populations, a single individual carried an average of 31.1% (± 0.005 SD) of the allelic diversity. It required a minimum of 21 individuals to carry 95% of worldwide SNP diversity and 57 individuals to carry 99% (table 3). This is far greater than the effective population size during the Flood. However, even the minimum values for the effective population size during the Flood would have captured a significant proportion of the pre-Flood diversity (figure 1). By interpolation, with an effective population size

of only 4.5 people the Ark passengers could easily have contained up to 77.3% of the then-circulating alleles. In the worst-case scenario, with an effective population size slightly less than 2.0, approximately 57.3% of all created alleles would be expected to have been captured. And, using any modern population as a proxy for the pre-Flood world would produce similar results (figure 2).

Discussion

If we wish to know if the biblical Creation–Flood–Babel model is realistic, we need to evaluate the percentage of the antediluvian allelic diversity that could have been carried by the Ark passengers. The majority of created diversity alleles should have been on the Ark. Even though it would require dozens of people to capture 95% or more of the pre-Flood diversity, the Ark passengers would have captured at least the majority of alleles even in the worst-case scenarios. Rounding off, we can conclude that on the order of 60–80% of pre-Flood diversity should have been retained through the Flood.

Since mutations, by definition, always enter the population at a frequency of $\frac{1}{2n}$, and since nearly all new mutations are lost to drift within a few generations,⁶ mutations are almost always rare. It would take strong selection, extreme levels of genetic drift during a long and narrow bottleneck, or vast periods of time to drive most mutations to any appreciable frequency. Due to the fact that rare alleles were less likely to have

been captured by the Ark passengers, pre-Flood mutations were more likely to have been lost than created alleles.

Alternatively, depending on initial conditions, created alleles should have started off at a high frequency. In the simplest model, God created Adam's genome with millions of heterozygous alleles. Any variation that Adam carried would have had an initial frequency of 0.5. Since Eve was manufactured from Adam's flesh, a simplifying assumption is that she would have carried any heterozygous sites he did, with the exception of Adam's Y chromosome, while Adam's X chromosome would have been doubled in Eve.

An alternate model has Eve being a haploid clone of Adam, meaning all alleles start out at a frequency of 0.75, 0.5, or 0.25. There are other, more complex models where, for instance, God engineered multiple different genomes into the reproductive cells of both Adam and Eve. All people who came after Adam and Eve (with the exception of Jesus) had to have been produced by normal sexual reproduction, but there is really no limit to the amount of diversity that could have been front-loaded into Adam and Eve. In this case, the allelic diversity of the pre-Flood world would have depended on how many children they had.

But exotic models, however interesting, are probably not needed. If the average person alive today carries approximately $\frac{1}{3}$ of all the common alleles in the world (figures 1 and 2), it would not be a stretch for God to have put those alleles right into the founding couple. And, since the most common alleles are generally not disease-causing,⁷ this level of heterozygosity should not have been harmful.

Also, from the data presented here, it is clear that common alleles were more likely to have been captured. This is something that Woodmorappe noticed more than 20 years ago,⁸ but here I quantify it more clearly. The Flood, instead of having a negative effect, would have removed a good deal of the antediluvian mutation burden, to the extent that it existed. Some of the remaining mutations could have drifted to higher frequencies during the post-Flood population rebound,² but the number should not have been extreme.

More than 20% of created diversity should have been lost. Did this have an effect on human phenotypic diversity, lifespan, or intelligence? Perhaps, but rapid post-Flood population growth should have prevented further loss of genetic diversity. Populations in exponential growth generally

do not undergo genetic drift, especially after reaching a size of a few hundred individuals.² In the end, we can see the effects of the Flood bottleneck. It would have removed some of the pre-Flood diversity. That is impossible to ignore. However, most of the diversity, especially most of the created diversity, should have made it through the bottleneck and, thus, should still be around today.

References

1. The terms 'effective population size' and 'inbreeding coefficient' are used here in a slightly different sense than the standard use among population geneticists. Technically, effective population size is defined as the number of individuals in a population that contribute offspring to the next generation. However, it is usually back-calculated from genetic data (as in, "How many individuals would be required to carry the diversity we see in the population today?"), as they rarely know exactly how many individuals in a population sire offspring at any point in time. The inbreeding coefficient is technically defined as the probability that any variant carried by two individuals and chosen at random will be identical by descent. In other words, the probability they carry the same stretch of DNA because it was mutually inherited from a common ancestor. In both cases the phrases are technically used correctly, even if most population geneticists would not think to apply them to biblical scenarios.
2. Carter, R.W. and Powell, M., The genetic effects of the population bottleneck associated with the Genesis Flood, *J. Creation* 30(2):102–111, 2016; creation.com/bottleneck-effects.
3. The International HapMap 3 Consortium, Integrating common and rare genetic variation in diverse human populations, *Nature* 467(7311):52–58, 2010 | doi:10.1038/nature09298.
4. The 1000 Genomes Project Consortium, An integrated map of genetic variation from 1,092 human genomes, *Nature* 491(7422):56–65, 2012 | doi:10.1038/nature11632.
5. This formula is simply a product of the population size (n) and the fact that there are two copies of each chromosome in each individual. Mutations appear mostly as copying errors in one of the chromosomal copies, hence their starting frequency is always $\frac{1}{2n}$.
6. Rupe, C.L. and Sanford, J.C., Using numerical simulation to better understand fixation rates, and establishment of a new principle: Haldane's Ratchet, *Proceedings of the Seventh International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, 2013.
7. The most common alleles are generally not disease-causing. A basic expectation of evolutionary theory is that selection should act to reduce the frequency of disease-causing alleles over time. However, this is also borne out in multiple genetic studies, e.g. the great majority of the 1.3 million alleles sampled by the HapMap Project are not associated with disease phenotypes. Most creation models would assume all 'created diversity' alleles would not be deleterious while perhaps many post-creation mutations would be.
8. Woodmorappe, J., *Noah's Ark: A feasibility study*, Institute for Creation Research, Santee, CA, pp. 192–195, 1996.

Table 3. The number of individuals required to capture 95% and 99% of common worldwide SNP diversity. After removing children from the 2-parent-child trios, some of the populations did not have enough individuals to reach all levels.

Population	<i>n</i> for 95%	<i>n</i> for 99%
ASW	n/a	n/a
CEU	27	n/a
CHB	27	61
CHD	26	66
GIH	21	57
JPT	25	61
LWK	24	62
MEX	23	n/a
MKK	23	n/a
TSI	23	62
YRI	23	n/a
Average	24.2	61.5

Robert Carter received his Bachelor of Science in Applied Biology from the Georgia Institute of Technology in 1992 and his Ph.D. in Coral Reef Ecology from the University of Miami in 2003. He has studied the genetics of fluorescent proteins in corals and sea anemones and holds one patent on a particular fluorescent protein gene. His current research involves looking for genetic patterns in the human genome and the development of a biblical model of human genetic history. He works as a speaker and scientist at CMI-US.

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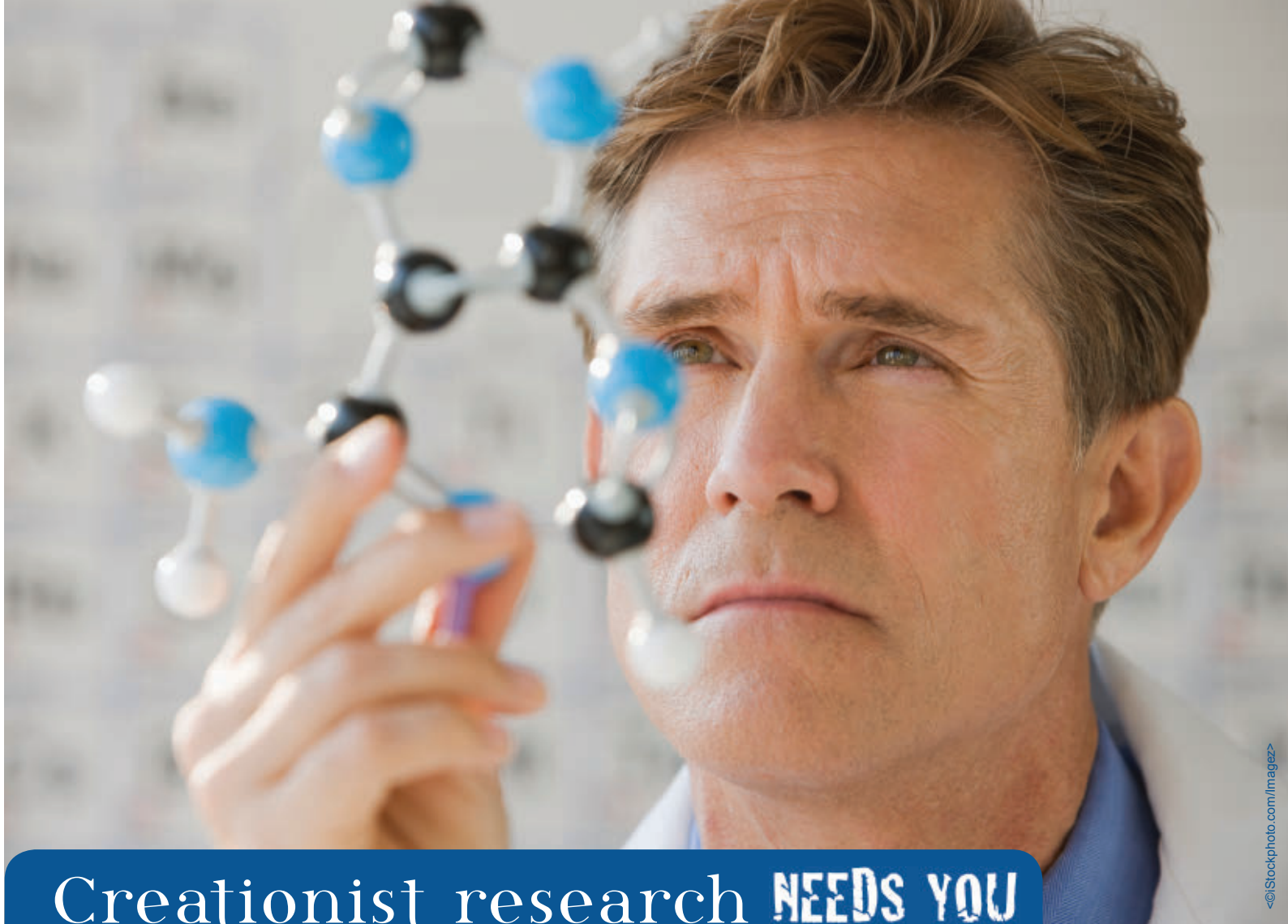
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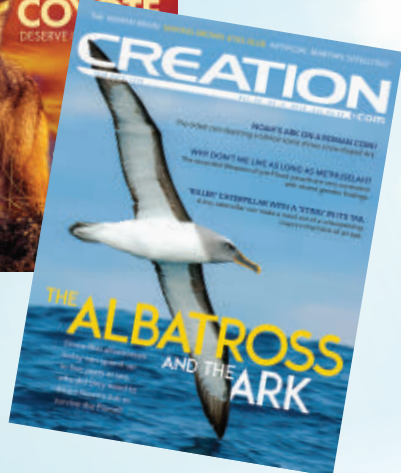
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